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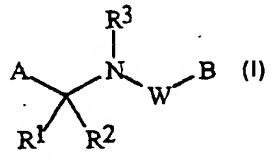
(54) Title: BENZAMIDES AND ADVANTAGEOUS COMPOSITIONS THEREOF FOR USE AS FUNGICIDES



(57) Abstract: Compositions for controlling plant diseases caused by fungal plant pathogens are described, comprising: (a) a fungicidally effective amount of a compound of Formula (I) (including all geometric and stereoisomers, *N*-oxides, and agriculturally suitable salts thereof) wherein A, B, W, R^1, R^2, and R^3 are as defined in the disclosure; and (b) at least one compound selected from the group consisting of (b1) alkylenebis(dithiocarbamate) fungicides; (b2) compounds acting at the bc_1complex of the fungal mitochondrial respiratory electron transfer site; (b3) cymoxanil; (b4) compounds acting at the demethylase enzyme of the sterol biosynthesis pathway; (b5) morpholine and piperidine compounds that act on the sterol biosynthesis pathway; (b6) phenylamide fungicides; (b7) pyrimidinone fungicides; (b8) phthalimides; and (b9) fosetyl-aluminum.Also disclosed are methods for controlling plant diseases caused by fungal plant pathogens that involves applying an effective amount of the combinations described. Also disclosed are certain compounds of Formula (I).

TITLE

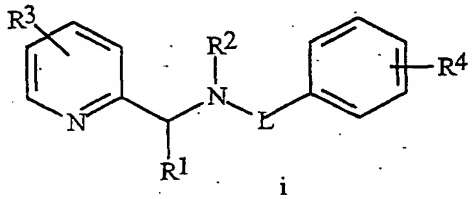
BENZAMIDES AND ADVANTAGEOUS COMPOSITIONS THEREOF FOR USE AS FUNGICIDES

BACKGROUND OF THE INVENTION

This invention relates to certain benzamides, their *N*-oxides, agriculturally suitable salts, certain advantageous compositions containing a mixture of benzamides and other fungicides and methods of their use as fungicides.

The control of plant diseases caused by fungal plant pathogens is extremely important in achieving high crop efficiency. Plant disease damage to ornamental, vegetable, field, cereal, and fruit crops can cause significant reduction in productivity and thereby result in increased costs to the consumer. Many products are commercially available for these purposes, but the need continues for new products that are more effective, less costly, less toxic, or environmentally safer.

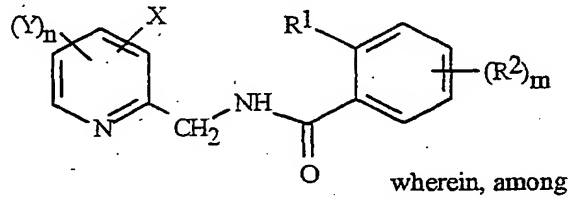
WO 99/42447 discloses certain benzamides of formula i as fungicides



i

wherein, among others,
R^1 is H, alkyl or acyl;
R^2 is H or alkyl; and
L is -(C=O)-, $-SO_2-$ or -(C=S)-.

WO 02/16322 discloses a novel process for preparing certain benzamides of formula ii that are useful as fungicides



ii

wherein, among others,
X is halogen;
Y is halogen, haloalkyl, alkoxycarbonyl or alkylsulfonyl;
each R^1 and R^2 is idependently halogen;
m is 0,1 or 2; and
n is 0 to 3.

Fungicides that effectively control plant fungi, particularly of the class Oomycetes, such as *Phytophthora* spp. and *Plasmopara* spp., are in constant demand by growers. Combinations of fungicides are often used to facilitate disease control and to retard resistance development. It is desirable to enhance the activity spectrum and the efficacy of disease control by using mixtures of active ingredients that provide a combination of

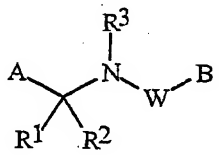
curative, systemic and preventative control of plant pathogens. Also desirable are combinations that provide greater residual control to allow for extended spray intervals. It is also very desirable to combine fungicidal agents that inhibit different biochemical pathways in the fungal pathogens to retard development of resistance to any one particular plant disease control agent.

It is in all cases particularly advantageous to be able to decrease the quantity of chemical agents released in the environment while ensuring effective protection of crops from diseases caused by plant pathogens. Mixtures of fungicides may provide significantly better disease control than could be predicted based on the activity of the individual components. This synergism has been described as "the cooperative action of two components of a mixture, such that the total effect is greater or more prolonged than the sum of the effects of the two (or more) taken independently" (see Tames, P. M. L., *Neth. J. Plant Pathology*, (1964), 70, 73-80).

There is a desire to find fungicidal agents that are particularly advantageous in achieving one or more of the preceding objectives.

SUMMARY OF THE INVENTION

This invention provides a composition for controlling plant diseases caused by fungal plant pathogens comprising (a) at least one compound of Formula I (including all geometric and stereoisomers), *N*-oxides and agriculturally suitable salts thereof:



I

wherein

A is a substituted pyridinyl ring;

B is a substituted phenyl ring;

W is C=L or SO_n;

L is O or S;

R^1 and R^2 are each independently H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_6 cycloalkyl, each optionally substituted;

R^3 is H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_6 cycloalkyl, C_2-C_{10} alkoxyalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl or C_3-C_8 dialkylaminocarbonyl; and

n is 1 or 2; and

(b) at least one compound selected from the group consisting of

(b1) alkylenebis(dithiocarbamate) fungicides;

(b2) compounds acting at the bc_1 complex of the fungal mitochondrial respiratory electron transfer site;

(b3) cymoxanil;

(b4) compounds acting at the demethylase enzyme of the sterol biosynthesis pathway;

(b5) morpholine and piperidine compounds that act on the sterol biosynthesis pathway;

(b6) phenylamide fungicides;

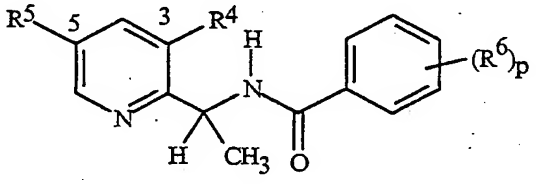
(b7) pyrimidinone fungicides;

(b8) phthalimides; and

(b9) fosetyl-aluminum.

This invention also relates to a method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof, or to the plant seed or seedling, a fungicidally effective amount of a composition of the invention.

This invention also provides a compound of Formula Ia (including all geometric and stereoisomers), *N*-oxides and agriculturally suitable salts thereof:



Ia

wherein

R^4 is halogen;

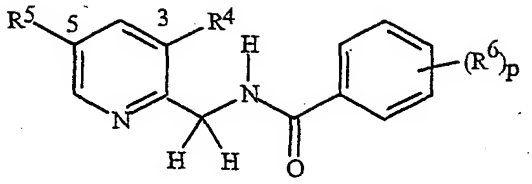
R^5 is C_1-C_6 alkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl;

each R^6 is independently C_1-C_6 alkyl, C_1-C_6 haloalkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused 5- or 6-membered nonaromatic heterocyclic ring containing one or two oxygen atoms and optionally substituted with from one to four substituents independently selected from F or methyl; and

p is 1, 2, 3 or 4.

This invention also provides a compound of Formula Ib (including all geometric and stereoisomers), *N*-oxides and agriculturally suitable salts thereof:



Ib

wherein

R^4 is halogen;

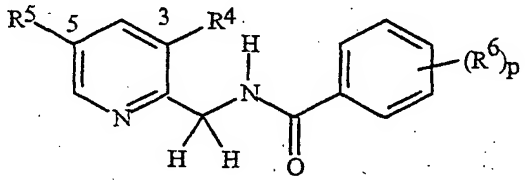
R^5 is C_1-C_4 haloalkoxy, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl;

each R^6 is independently C_1-C_6 alkyl, C_1-C_6 haloalkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused 5- or 6-membered nonaromatic heterocyclic ring containing one or two oxygen atoms and optionally substituted with from one to four substituents independently selected from F or methyl; and

p is 1, 2, 3 or 4.

This invention also provides a compound of Formula Ic (including all geometric and stereoisomers), *N*-oxides and agriculturally suitable salts thereof:



Ic

wherein

R^4 is Cl or Br;

R^5 is Br or I;

each R^6 is independently C_1-C_6 alkyl, C_1-C_6 haloalkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl; or

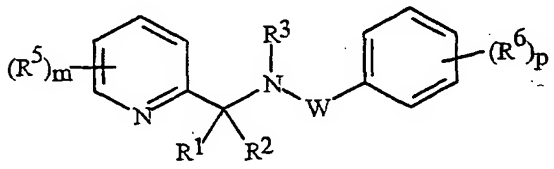
two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused 5- or 6-membered nonaromatic heterocyclic ring containing one or two oxygen atoms and optionally substituted with from one to four substituents independently selected from F or methyl; and

p is 1, 2, 3 or 4.

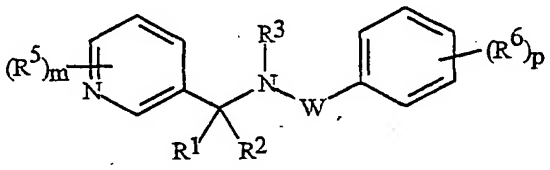
DETAILS OF THE INVENTION

As noted above, A is a substituted pyridinyl ring and B is a substituted phenyl ring. The term "substituted" in connection with these A or B groups refers to groups that have at least one non-hydrogen substituent that does not extinguish the fungicidal activity. Examples of Formula I incorporating said pyridinyl rings in which A is substituted with 1 to 4 R^5, B is substituted with 1 to 4 R^6 include the rings illustrated in Exhibit 1 wherein m and p are independently integers from 1 to 4. Note that the attachment point between $(R^5)_m$ and A and $(R^6)_p$ and B is illustrated as floating, and $(R^5)_m$ and $(R^6)_p$ can be attached to any available carbon atom of the A and B rings respectively.

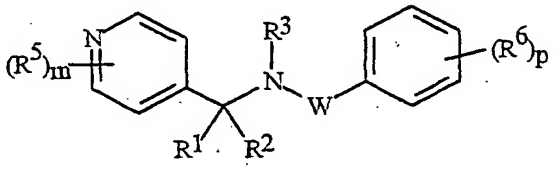
Exhibit 1



I-1



I-2



I-3

Examples of R^5 when attached to A and R^6 when attached to B include:

each R^5 and R^6 is independently C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_6 cycloalkyl, C_1-C_6 haloalkyl, C_2-C_6 haloalkenyl, C_2-C_6 haloalkynyl, C_3-C_6 halocycloalkyl, halogen, CN, CO_2H, $CONH_2$, NO_2, hydroxy, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl, C_1-C_4 haloalkylsulfonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino, C_3-C_6 cycloalkylamino, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl, C_3-C_8 dialkylaminocarbonyl or C_3-C_6 trialkylsilyl; or

each R^5 and R^6 is independently a phenyl, a benzyl, a phenoxy, a 5- or 6-membered heteroaromatic ring or a 5- or 6-membered nonaromatic heterocyclic ring, each ring optionally substituted with from one to three substituents independently selected from R^7; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused phenyl ring, a fused 5- or 6-membered nonaromatic carbocyclic

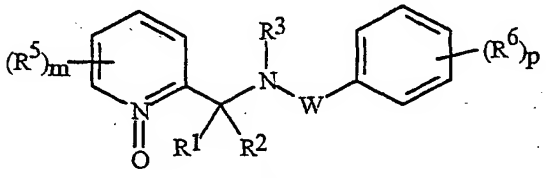
ring, a fused 5- or 6-membered heteroaromatic ring or a fused 5- or 6-membered nonaromatic heterocyclic ring, each fused ring optionally substituted with from one to four substituents independently selected from R^7;

each R^7 is independently C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_6 cycloalkyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 halocycloalkyl, halogen, CN, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino, C_3-C_6 cycloalkylamino, C_3-C_6 (alkyl)cycloalkylamino, C_2-C_4 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl, C_3-C_8 dialkylaminocarbonyl or C_3-C_6 trialkylsilyl.

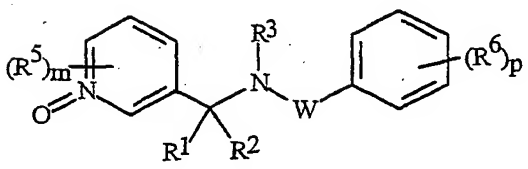
As noted above, R^1 and R^2 are each independently H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_6 cycloalkyl, each optionally substituted. The term "optionally substituted" in connection with these R^1 and R^2 groups refers to groups that are unsubstituted or have at least one non-hydrogen substituent that does not extinguish the fungicidal activity possessed by the unsubstituted analog. Examples of optionally substituted R^1 and R^2 groups are those that are optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO_2, hydroxy, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_2-C_4 alkoxycarbonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino and C_3-C_6 cycloalkylamino. Although these substituents are listed in the examples above, it is noted that they do not need to be present since they are optional substituents. Of note are R^1 and R^2 groups that are optionally substituted with one to four substituents selected from the group above.

Examples of *N*-oxides of Formula I are illustrated as I-4 through I-6 in Exhibit 2, wherein R^1, R^2, R^3, R^5, R^6, W, m and p are as defined above.

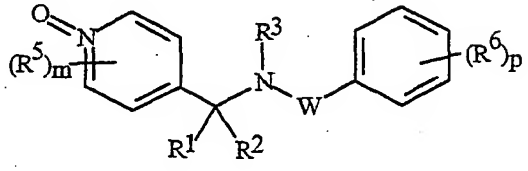
Exhibit 2



I-4



I-5



I-6

In the above recitations, the term "alkyl", used either alone or in compound words such as "alkylthio" or "haloalkyl" includes straight-chain or branched alkyl, such as, methyl, ethyl, *n*-propyl, *i*-propyl, or the different butyl, pentyl or hexyl isomers. "Alkenyl" includes straight chain or branched alkenes such as ethenyl, 1-propenyl, 2-propenyl, and the different butenyl, pentenyl and hexenyl isomers. "Alkenyl" also includes polyenes such as 1,2-propadienyl and 2,4-hexadienyl. "Alkynyl" includes straight chain or branched alkynes such as ethynyl, 1-propynyl, 2-propynyl and the different butynyl, pentynyl and hexynyl isomers. "Alkynyl" can also include moieties comprised of multiple triple bonds such as 2,5-hexadiynyl. "Alkoxy" includes, for example, methoxy, ethoxy, *n*-propyloxy, isopropyloxy and the different butoxy, pentoxy and hexyloxy isomers. "Alkoxyalkyl" denotes alkoxy substitution on alkyl. Examples of "alkoxyalkyl" include CH_3OCH_2, $CH_3OCH_2CH_2$, $CH_3CH_2OCH_2$, $CH_3CH_2CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$. "Alkoxyalkoxy" denotes alkoxy substitution on alkoxy. The term "Alkenyloxy" includes straight chain or branched alkenyloxy moieties. Examples of "alkenyloxy" include $H_2C=CHCH_2O$, $(CH_3)_2C=CHCH_2O$, $(CH_3)CH=CHCH_2O$, $(CH_3)CH=C(CH_3)CH_2O$ and $CH_2=CHCH_2CH_2O$. "Alkynyloxy" includes straight chain or branched alkynyloxy moieties. Examples of "alkynyloxy" include $HC\equiv CCH_2O$, $CH_3C\equiv CCH_2O$ and $CH_3C\equiv CCH_2CH_2O$. "Alkylthio" includes branched or straight chain alkylthio moieties such as methylthio, ethylthio, and the different propylthio, butylthio, pentylthio and hexylthio isomers. "Alkylsulfinyl" includes both enantiomers of an alkylsulfinyl group. Examples of "alkylsulfinyl" include $CH_3S(O)$, $CH_3CH_2S(O)$, $CH_3CH_2CH_2S(O)$, $(CH_3)_2CHS(O)$ and the different butylsulfinyl, pentylsulfinyl and hexylsulfinyl isomers. Examples of "alkylsulfonyl" include $CH_3S(O)_2$, $CH_3CH_2S(O)_2$, $CH_3CH_2CH_2S(O)_2$, $(CH_3)_2CHS(O)_2$ and the different butylsulfonyl, pentylsulfonyl and hexylsulfonyl isomers. "Alkylamino", "dialkylamino", "alkenylthio", "alkenylsulfinyl", "alkenylsulfonyl", "alkynylthio", "alkynylsulfinyl", "alkynylsulfonyl", and the like, are defined analogously to the above examples. "Cycloalkyl" includes, for example, cyclopropyl, cyclobutyl, cyclopentyl, and cyclohexyl. The term "cycloalkoxy" includes the same groups linked through an oxygen atom such as cyclopentyloxy and cyclohexyloxy.

The term "halogen", either alone or in compound words such as "haloalkyl", includes fluorine, chlorine, bromine or iodine. Further, when used in compound words such as "haloalkyl", said alkyl may be partially or fully substituted with halogen atoms which may be the same or different. Examples of "haloalkyl" include F_3C, $ClCH_2$, CF_3CH_2 and CF_3CCl_2. The terms "haloalkenyl", "haloalkynyl", "haloalkoxy", "haloalkylthio", and the like, are defined analogously to the term "haloalkyl". Examples of "haloalkenyl" include $(Cl)_2C=CHCH_2$ and $CF_3CH_2CH=CHCH_2$. Examples of "haloalkynyl" include $HC\equiv CCHCl$, $CF_3C\equiv C$, $CCl_3C\equiv C$ and $FCH_2C\equiv CCH_2$. Examples of "haloalkoxy" include CF_3O, CCl_3CH_2O, $HCF_2CH_2CH_2O$ and CF_3CH_2O. Examples of "haloalkylthio" include CCl_3S,

CF_3S, CCl_3CH_2S and $ClCH_2CH_2CH_2S$. Examples of "haloalkylsulfinyl" include $CF_3S(O)$, $CCl_3S(O)$, $CF_3CH_2S(O)$ and $CF_3CF_2S(O)$. Examples of "haloalkylsulfonyl" include $CF_3S(O)_2$, $CCl_3S(O)_2$, $CF_3CH_2S(O)_2$ and $CF_3CF_2S(O)_2$. Examples of "alkylcarbonyl" include $C(O)CH_3$, $C(O)CH_2CH_2CH_3$ and $C(O)CH(CH_3)_2$. Examples of "alkoxycarbonyl" include $CH_3OC(=O)$, $CH_3CH_2OC(=O)$, $CH_3CH_2CH_2OC(=O)$, $(CH_3)_2CHOC(=O)$ and the different butoxy- or pentoxycarbonyl isomers.

"Aromatic" indicates that each of the ring atoms is essentially in the same plane and has a *p*-orbital perpendicular to the ring plane, and in which $(4n + 2)$ π electrons, when n is 0 or a positive integer, are associated with the ring to comply with Hückel's rule. The term "aromatic carbocyclic ring" includes fully aromatic carbocycles (e.g. phenyl). The term "nonaromatic carbocyclic ring" denotes fully saturated carbocycles as well as partially or fully unsaturated carbocycles where the Hückel rule is not satisfied. The term "hetero" in connection with rings refers to a ring in which at least one ring atom is not carbon and which can contain 1 to 4 heteroatoms independently selected from the group consisting of nitrogen, oxygen and sulfur, provided that each ring contains no more than 4 nitrogens, no more than 2 oxygens and no more than 2 sulfurs. The terms "heteroaromatic ring includes fully aromatic heterocycles. The term "nonaromatic heterocyclic ring" denotes fully saturated heterocycles as well as partially or fully unsaturated heterocycles where the Hückel rule is not satisfied. The heterocyclic ring can be attached through any available carbon or nitrogen by replacement of a hydrogen on said carbon or nitrogen.

One skilled in the art will appreciate that not all nitrogen containing heterocycles can form *N*-oxides since the nitrogen requires an available lone pair for oxidation to the oxide; one skilled in the art will recognize those nitrogen containing heterocycles which can form *N*-oxides. One skilled in the art will also recognize that tertiary amines can form *N*-oxides. Synthetic methods for the preparation of *N*-oxides of heterocycles and tertiary amines are very well known by one skilled in the art including the oxidation of heterocycles and tertiary amines with peroxy acids such as peracetic and *m*-chloroperbenzoic acid (MCPBA), hydrogen peroxide, alkyl hydroperoxides such as *t*-butyl hydroperoxide, sodium perborate, and dioxiranes such as dimethydioxirane. These methods for the preparation of *N*-oxides have been extensively described and reviewed in the literature, see for example: T. L. Gilchrist in *Comprehensive Organic Synthesis*, vol. 7, pp 748-750, S. V. Ley, Ed., Pergamon Press; M. Tisler and B. Stanovnik in *Comprehensive Heterocyclic Chemistry*, vol. 3, pp 18-20, A. J. Boulton and A. McKillop, Eds., Pergamon Press; M. R. Grimmett and B. R. T. Keene in *Advances in Heterocyclic Chemistry*, vol. 43, pp 149-161, A. R. Katritzky, Ed., Academic Press; M. Tisler and B. Stanovnik in *Advances in Heterocyclic Chemistry*, vol. 9, pp 285-291, A. R. Katritzky and A. J. Boulton, Eds., Academic Press; and G. W. H. Cheeseman and E. S. G. Werstiuk in *Advances in Heterocyclic Chemistry*, vol. 22, pp 390-392, A. R. Katritzky and A. J. Boulton, Eds., Academic Press.

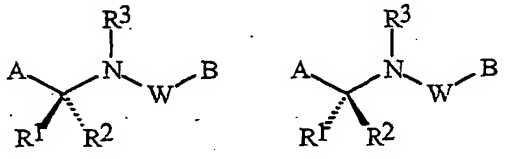
The total number of carbon atoms in a substituent group is indicated by the "C_i-C_j" prefix where i and j are numbers from 1 to 8. For example, C_1-C_3 alkylsulfonyl designates methylsulfonyl through propylsulfonyl; C_2 alkoxyalkyl designates CH_3OCH_2; C_3 alkoxyalkyl designates, for example, $CH_3CH(OCH_3)$, $CH_3OCH_2CH_2$ or $CH_3CH_2OCH_2$; and C_4 alkoxyalkyl designates the various isomers of an alkyl group substituted with an alkoxy group containing a total of four carbon atoms, examples including $CH_3CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$.

When a compound is substituted with a substituent bearing a subscript that indicates the number of said substituents can exceed 1, said substituents (when they exceed 1) are independently selected from the group of defined substituents. Further, when the subscript indicates a range, e.g. $(R)_{i-j}$, then the number of substituents may be selected from the integers between i and j inclusive.

When a group contains a substituent which can be hydrogen, for example R^1 or R^2 then, when this substituent is taken as hydrogen, it is recognized that this is equivalent to said group being unsubstituted.

Compounds of Formula I can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers, atropisomers and geometric isomers. One skilled in the art will appreciate that one stereoisomer may be more active and/or may exhibit beneficial effects when enriched relative to the other stereoisomer(s) or when separated from the other stereoisomer(s). Additionally, the skilled artisan knows how to separate, enrich, and/or to selectively prepare said stereoisomers. Accordingly, the present invention comprises compounds selected from Formula I, *N*-oxides and agriculturally suitable salts thereof. The compounds of Formula I may be present as a mixture of stereoisomers, individual stereoisomers, or as an optically active form. In particular, when R^1 and R^2 of Formula I are different, then said Formula possesses a chiral center at the carbon to which R^1 and R^2 are commonly bonded.

This invention includes racemic mixtures of equal parts of Formula I' and Formula I".



I' I"

wherein A, B W, R^1, R^2 and R^3 are as defined above.

In addition, this invention includes compositions that are enriched compared to the racemic mixture in an enantiomer of the Formula I' or Formula I". This invention also includes compositions wherein component (a) is enriched in a component (a) enantiomer of

Formula I' compared to the racemic mixture of component (a). Included are compositions comprising the essentially pure enantiomers of Formula I'. This invention also includes compositions wherein component (a) is enriched in a component (a) enantiomer of Formula I" compared to the racemic mixture of component (a). Included are compositions comprising the essentially pure enantiomers of Formula I".

When enantiomerically enriched, one enantiomer is present in greater amounts that the other and the extent of enrichment can be defined by an expression of enantiomer excess("ee"), which is defined as 100(2x-1) where x is the mole fraction of the dominant enantiomer in the enantiomer mixture (e.g., an ee of 20% corresponds to a 60:40 ratio of enantiomers).

The more active enantiomer with respect to the relative positions of R^1, R^2, A and the rest of the molecule bonded through nitrogen corresponds to the configuration of the enantiomer of Formula I that, when in a solution of $CDCl_3$, rotates plane polarized light in the (+) or *dextro* direction.

Preferably there is at least a 50% enantiomeric excess; more preferably at least a 75 % enantiomeric excess; still more preferably at least a 90% enantiomeric excess; and the most preferably at least a 94% enantiomeric excess of the more active isomer of Formula I. Of particular note are enantiomerically pure embodiments of the more active isomer of Formula I.

The salts of the compounds of Formula I include acid-addition salts with inorganic or organic acids such as hydrobromic, hydrochloric, nitric, phosphoric, sulfuric, acetic, butyric, fumaric, lactic, maleic, malonic, oxalic, propionic, salicylic, tartaric, 4-toluenesulfonic or valeric acids. The salts of the compounds of Formula I also include those formed with organic bases (e.g., pyridine, ammonia, or triethylamine) or inorganic bases (e.g., hydrides, hydroxides, or carbonates of sodium, potassium, lithium, calcium, magnesium or barium) when the compound contains an acidic group such as a carboxylic acid or phenol.

Preferred compositions of the invention, wherein (a) comprises compounds of Formula I, for reasons of better activity and/or ease of synthesis are:

Preferred 1. Preferred are compositions wherein in Formula I

A is a pyridinyl ring substituted with from 1 to 4 R^5;

B is a phenyl ring substituted with from 1 to 4 R^6;

W is C=O;

R^1 and R^2 are each independently H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_6 cycloalkyl, each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO_2, hydroxy, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_2-C_4 alkoxycarbonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino and C_3-C_6 cycloalkylamino;

R^3 is H; and

each R^5 and R^6 is independently C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_6 cycloalkyl, C_1-C_6 haloalkyl, C_2-C_6 haloalkenyl, C_2-C_6 haloalkynyl, C_3-C_6 halocycloalkyl, halogen, CN, CO_2H, $CONH_2$, NO_2, hydroxy, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl, C_1-C_4 haloalkylsulfonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino, C_3-C_6 cycloalkylamino, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl, C_3-C_8 dialkylaminocarbonyl or C_3-C_6 trialkylsilyl; or

each R^5 and R^6 is independently a phenyl, a benzyl, a phenoxy, a 5- or 6-membered heteroaromatic ring or a 5- or 6-membered nonaromatic heterocyclic ring, each ring optionally substituted with one to three substituents independently selected from R^7; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused phenyl ring, a fused 5- or 6-membered nonaromatic carbocyclic ring, a fused 5- or 6-membered heteroaromatic ring or a fused 5- or 6-membered nonaromatic heterocyclic ring, each fused ring optionally substituted with one to four substituents independently selected from R^7; and

each $R^7$is independently C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_6 cycloalkyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 halocycloalkyl, halogen, CN, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino, C_3-C_6 cycloalkylamino, C_3-C_6 (alkyl)cycloalkylamino, C_2-C_4 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl, C_3-C_8 dialkylaminocarbonyl or C_3-C_6 trialkylsilyl.

Of note are compositions of Preferred 1 wherein A is a substituted 3-pyridinyl ring.

Preferred 2. Compositions of Preferred 1 wherein

A is a 2-pyridinyl ring substituted with from 1 to 4 R^5; and

B is substituted with from 1 to 4 R^6, with at least one R^6 located in a position *ortho* to the link with W.

Of note are compositions wherein each R^6 is independently F, Cl, Br, I, CH_3, OCH_3, OCF_3, $OCHF_2$, CF_3 or NO_2. Also of note are compositions wherein at least one R^6 is iodo.

Preferred 3. Compositions of Preferred 2 wherein B is substituted with an R^6 at each position *ortho* to the link with W, and optionally one additional R^6, and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3 or CF_3.

Of note are compositions wherein each R^6 is either halogen or methyl.

Preferred 4. Compositions of Preferred 3 wherein B is substituted with one R^6 as a Cl located at the 2-position *ortho* to the link with W, another R^6 is selected from Cl or methyl and is located at the 6-position *ortho* to the link with W and a third optional R^6 is methyl at the 4-position.

Preferred 5. Compositions of Preferred 4 wherein A is 3-chloro-5-CF_3-2-pyridinyl.

Preferred compositions of this invention include those of Preferred 1 through Preferred 5 wherein R^1 is H and R^2 is H or CH_3. More preferred are compositions of Preferred 1 through Preferred 5 wherein R^1 is H and R^2 is CH_3.

Specifically preferred are compositions comprising a compound selected from the group consisting of

2,6-dichloro-*N*-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]benzamide,
2,6-dichloro-*N*-[1-[3-chloro-5-(trifluoromethyl)-2-pyridinyl]ethyl]benzamide,
2,6-dichloro-*N*-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]-4-methylbenzamide,
2,6-dichloro-*N*-[1-[3-chloro-5-(trifluoromethyl)-2-pyridinyl]ethyl]-4-methylbenzamide,
2,6-dichloro-*N*-[(3,5-dichloro-2-pyridinyl)methyl]benzamide,
2,6-dichloro-*N*-[1-(3,5-dichloro-2-pyridinyl)ethyl]benzamide,
2,6-dichloro-*N*-[(3,5-dichloro-2-pyridinyl)methyl]-4-methylbenzamide, and
2,6-dichloro-*N*-[1-(3,5-dichloro-2-pyridinyl)ethyl]-4-methylbenzamide.

Of note are compositions comprising a compound selected from the group consisting of

2,6-dichloro-*N*-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]benzamide (also known as *N*-[(3-chloro-5-trifluoromethyl-2-pyridyl)methyl]-2,6-dichlorobenzamide),
N-[[(3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]-2,6-difluorobenzamide (also known as *N*-[(3-chloro-5-trifluoromethyl-2-pyridyl)methyl]-2,6-difluorobenzamide),
2-chloro-*N*-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]-6-fluorobenzamide (also known as *N*-[(3-chloro-5-trifluoromethyl-2-pyridyl)methyl]-2-chloro-6-fluorobenzamide),
N-[[(3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]-2,3-difluorobenzamide (also known as *N*-[(3-chloro-5-trifluoromethyl-2-pyridyl)methyl]- 2,3-difluorobenzamide),
N-[[(3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]-2,4,6-trifluorobenzamide (also known as *N*-[(3-chloro-5-trifluoromethyl-2-pyridyl)methyl]-2,4,6-trifluorobenzamide), and

2-bromo-6-chloro-*N*-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]methyl]benzamide (also known as *N*-[(3-chloro-5-trifluoromethyl-2-pyridyl)methyl]-2-bromo-6-chlorobenzamide).

This invention also relates to a method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof, or to the plant seed or seedling, a fungicidally effective amount of the composition of the invention (i.e., as a composition described herein). The preferred methods of use are those involving the above-preferred compositions.

This invention also provides a compound of Formula Ia as described above. Preferred compounds of Formula Ia are:

Preferred A. Compounds of Formula Ia wherein R^5 is Cl, Br, I, CH_3, OCF_3, $OCHF_2$, OCH_2CF_3, OCF_2CF_3, OCF_2CF_2H, $OCHFCF_3$, SCF_3, $SCHF_2$, SCH_2CF_3, SCF_2CF_3, SCF_2CF_2H, $SCHFCF_3$, $SOCF_3$, $SOCHF_2$, $SOCH_2CF_3$, $SOCF_2CF_3$, $SOCF_2CF_2H$, $SOCHFCF_3$, SO_2CF_3, SO_2CHF_2, $SO_2CH_2CF_3$, $SO_2CF_2CF_3$, $SO_2CF_2CF_2H$ or SO_2CHFCF_3.

Preferred B. Compounds of Preferred A wherein at least one R^6 is located in a position *ortho* to the link with the C=O moiety and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3, OCF_3, $OCHF_2$, CF_3 or NO_2.

Preferred C. Compounds of Preferred B wherein there is an R^6 at each position *ortho* to the link with the C=O moiety, and optionally one additional R^6, and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3 or CF_3.

This invention also provides a compound of Formula Ib as described above. Preferred compounds of Formula Ib are:

Preferred D. Compounds of Formula Ib wherein R^5 is, OCF_3, $OCHF_2$, OCH_2CF_3, OCF_2CF_3, OCF_2CF_2H, $OCHFCF_3$, SCF_3, $SCHF_2$, SCH_2CF_3, SCF_2CF_3, SCF_2CF_2H, $SCHFCF_3$, $SOCF_3$, $SOCHF_2$, $SOCH_2CF_3$, $SOCF_2CF_3$, $SOCF_2CF_2H$, $SOCHFCF_3$, SO_2CF_3, SO_2CHF_2, $SO_2CH_2CF_3$, $SO_2CF_2CF_3$, $SO_2CF_2CF_2H$ or SO_2CHFCF_3.

Preferred E. Compounds of Preferred D wherein at least one R^6 is located in a position *ortho* to the link with the C=O moiety and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3, OCF_3, $OCHF_2$, CF_3 or NO_2.

Preferred F. Compounds of Preferred E wherein there is an R^6 at each position *ortho* to the link with the C=O moiety, and optionally one additional R^6, and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3 or CF_3.

This invention also provides a compound of Formula Ic as described above. Preferred compounds of Formula Ic are:

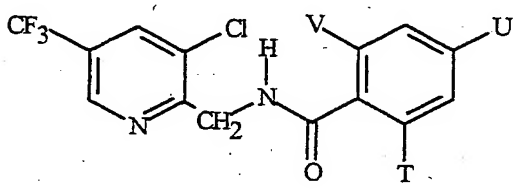
Preferred G. Compounds of Formula Ic wherein at least one R^6 is located in a position *ortho* to the link with the C=O moiety and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3, OCF_3, $OCHF_2$, CF_3 or NO_2.

Preferred H. Compounds of Preferred G wherein there is an R^6 at each position *ortho* to the link with the C=O moiety, and optionally one additional R^6, and each R^6 is independently F, Cl, Br, I, CH_3, OCH_3 or CF_3.

Compounds of Formula I can be prepared by one or more of the methods and variations described in WO99/42447 (See e.g., Example 4). Some compounds of Formula I can also be prepared by methods described in WO02/16322.

Examples of compounds of Formula I suitable for use in component (a) of the compositions of this invention include the following compounds of Tables 1-7. The following abbreviations are used in the Tables which follow: Me is methyl, Et is ethyl, Ph is phenyl, OMe is methoxy, OEt is ethoxy, CN is cyano, NO_2 is nitro. The substituents Q and R are equivalent to independent R^5 substituents that have been located in the positions indicated. The substituents T, U and V are equivalent to independent R^6 substituents that have been located in the positions indicated.

Table 1



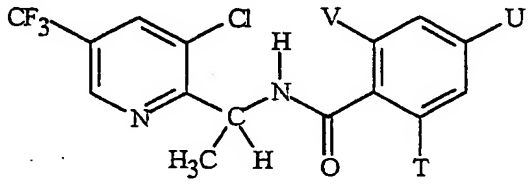
T	U	V	T	U	V	T	U	V	T	U	V
Me	Me	Me	OMe	Me	Me	Cl	NO_2	Me	Br	Me	Me
Me	Me	F	OMe	Me	F	Cl	NO_2	F	Br	Me	F
Me	Me	Cl	OMe	Me	Cl	Cl	NO_2	Cl	Br	Me	Cl
Me	Me	Br	OMe	Me	Br	Cl	NO_2	Br	Br	Me	Br
Me	Me	CF_3	OMe	Me	CF_3	Cl	NO_2	CF_3	Br	Me	CF_3
Me	Me	NO_2	OMe	Me	NO_2	Cl	NO_2	NO_2	Br	Me	NO_2
Me	Me	OMe	OMe	Me	OMe	Cl	NO_2	OMe	Br	Me	OMe
F	Me	Me	OMe	F	Me	CF_3	OMe	Me	CF_3	Me	Me
F	Me	F	OMe	F	F	CF_3	OMe	F	CF_3	Me	F
F	Me	Cl	OMe	F	Cl	CF_3	OMe	Cl	CF_3	Me	Cl
F	Me	Br	OMe	F	Br	CF_3	OMe	Br	CF_3	Me	Br
F	Me	CF_3	OMe	F	CF_3	CF_3	OMe	CF_3	CF_3	Me	CF_3
F	Me	NO_2	OMe	F	NO_2	F	OMe	Me	CF_3	Me	NO_2
F	Me	OMe	OMe	F	OMe	F	OMe	F	CF_3	Me	OMe
Cl	Me	Me	OMe	Cl	Me	F	OMe	Cl	NO_2	Me	Me
Cl	Me	F	OMe	Cl	F	F	OMe	Br	NO_2	Me	F
Cl	Me	Cl	OMe	Cl	Cl	F	OMe	CF_3	NO_2	Me	Cl

T	U	V	T	U	V	T	U	V	T	U	V
Cl	Me	Br	OMe	Cl	Br	F	OMe	NO_2	NO_2	Me	Br
Cl	Me	CF_3	OMe	Cl	CF_3	F	OMe	OMe	NO_2	Me	CF_3
Cl	Me	NO_2	OMe	Cl	NO_2	CF_3	OMe	NO_2	NO_2	Me	NO_2
Cl	Me	OMe	OMe	Cl	OMe	CF_3	OMe	OMe	NO_2	Me	OMe
Me	F	Me	OMe	H	Me	Br	OMe	NO_2	Br	F	Me
Me	F	F	OMe	H	F	Br	OMe	OMe	Br	F	F
Me	F	Cl	OMe	H	Cl	NO_2	NO_2	Me	Br	F	Cl
Me	F	Br	OMe	H	OMe	NO_2	NO_2	F	Br	F	Br
Me	F	CF_3	OMe	OMe	CF_3	NO_2	NO_2	Cl	Br	F	CF_3
Me	F	NO_2	OMe	OMe	NO_2	NO_2	NO_2	Br	Br	F	NO_2
Me	F	OMe	OMe	OMe	OMe	NO_2	NO_2	CF_3	Br	F	OMe
F	F	Me	OMe	Br	Me	NO_2	NO_2	NO_2	CF_3	F	Me
F	F	F	OMe	Br	F	NO_2	NO_2	OMe	CF_3	F	F
F	F	Cl	OMe	Br	Cl	Br	OMe	Me	CF_3	F	Cl
F	F	Br	OMe	Br	Br	Br	OMe	F	CF_3	F	Br
F	F	CF_3	OMe	Br	CF_3	Br	OMe	Cl	CF_3	F	CF_3
F	F	NO_2	OMe	Br	NO_2	Br	OMe	Br	CF_3	F	NO_2
F	F	OMe	OMe	Br	OMe	Br	OMe	CF_3	CF_3	F	OMe
Cl	F	Me	OMe	CF_3	Me	Me	NO_2	Me	NO_2	F	Me
Cl	F	F	OMe	CF_3	F	Me	NO_2	F	NO_2	F	F
Cl	F	Cl	OMe	CF_3	Cl	Me	NO_2	Cl	NO_2	F	Cl
Cl	F	Br	OMe	CF_3	Br	Me	NO_2	Br	NO_2	F	Br
Cl	F	CF_3	OMe	CF_3	CF_3	Me	NO_2	CF_3	NO_2	F	CF_3
Cl	F	NO_2	OMe	CF_3	NO_2	Me	NO_2	NO_2	NO_2	F	NO_2
Cl	F	OMe	OMe	CF_3	OMe	Me	NO_2	OMe	NO_2	F	OMe
Me	Cl	Me	OMe	NO_2	Me	F	NO_2	Me	Br	Cl	Me
Me	Cl	F	OMe	NO_2	F	F	NO_2	F	Br	Cl	F
Me	Cl	Cl	OMe	NO_2	Cl	F	NO_2	Cl	Br	Cl	Cl
Me	Cl	Br	OMe	NO_2	Br	F	NO_2	Br	Br	Cl	Br
Me	Cl	CF_3	OMe	NO_2	CF_3	F	NO_2	CF_3	Br	Cl	CF_3
Me	Cl	NO_2	OMe	NO_2	NO_2	F	NO_2	NO_2	Br	Cl	NO_2
Me	Cl	OMe	OMe	NO_2	OMe	F	NO_2	OMe	Br	Cl	OMe
F	Cl	Me	OMe	H	Br	Br	H	Me	CF_3	Cl	Me
F	Cl	F	OMe	H	CF_3	Br	H	F	CF_3	Cl	F
F	Cl	Cl	OMe	H	NO_2	Br	H	Cl	CF_3	Cl	Cl
F	Cl	Br	OMe	OMe	Me	Br	H	Br	CF_3	Cl	Br
F	Cl	CF_3	OMe	OMe	F	Br	H	CF_3	CF_3	Cl	CF_3

T	U	V	T	U	V	T	U	V	T	U	V
F	Cl	NO_2	OMe	OMe	Cl	Br	H	NO_2	CF_3	Cl	NO_2
F	Cl	OMe	OMe	OMe	Br	Br	H	OMe	CF_3	Cl	OMe
Cl	Cl	Me	F	H	Me	Me	OMe	Me	NO_2	Cl	Me
Cl	Cl	F	F	H	F	Me	OMe	F	NO_2	Cl	F
Cl	Cl	Cl	F	H	Cl	Me	OMe	Cl	NO_2	Cl	Cl
Cl	Cl	Br	F	H	Br	Me	OMe	Br	NO_2	Cl	Br
Cl	Cl	CF_3	F	H	CF_3	Me	OMe	CF_3	NO_2	Cl	CF_3
Cl	Cl	NO_2	F	H	NO_2	Me	OMe	NO_2	NO_2	Cl	NO_2
Cl	Cl	OMe	F	H	OMe	Me	OMe	OMe	NO_2	Cl	OMe
Me	Br	Me	Cl	H	Me	Br	NO_2	Me	Br	Br	Me
Me	Br	F	Cl	H	F	Br	NO_2	F	Br	Br	F
Me	Br	Cl	Cl	H	Cl	Br	NO_2	Cl	Br	Br	Cl
Me	Br	Br	Cl	H	Br	Br	NO_2	Br	Br	Br	Br
Me	Br	CF_3	Cl	H	CF_3	Br	NO_2	CF_3	Br	Br	CF_3
Me	Br	NO_2	Cl	H	NO_2	Br	NO_2	NO_2	Br	Br	NO_2
Me	Br	OMe	Cl	H	OMe	Br	NO_2	OMe	Br	Br	OMe
F	Br	Me	CF_3	H	Me	CF_3	NO_2	Me	CF_3	Br	Me
F	Br	F	CF_3	H	F	CF_3	NO_2	F	CF_3	Br	F
F	Br	Cl	CF_3	H	Cl	CF_3	NO_2	Cl	CF_3	Br	Cl
F	Br	Br	CF_3	H	Br	CF_3	NO_2	Br	CF_3	Br	Br
F	Br	CF_3	CF_3	H	CF_3	CF_3	NO_2	CF_3	CF_3	Br	CF_3
F	Br	NO_2	CF_3	H	NO_2	CF_3	NO_2	NO_2	CF_3	Br	NO_2
F	Br	OMe	CF_3	H	OMe	CF_3	NO_2	OMe	CF_3	Br	OMe
Cl	Br	Me	NO_2	H	Me	Cl	CF_3	Me	NO_2	Br	Me
Cl	Br	F	NO_2	H	F	Cl	CF_3	F	NO_2	Br	F
Cl	Br	Cl	NO_2	H	Cl	Cl	CF_3	Cl	NO_2	Br	Cl
Cl	Br	Br	NO_2	H	Br	Cl	CF_3	Br	NO_2	Br	Br
Cl	Br	CF_3	NO_2	H	CF_3	Cl	CF_3	CF_3	NO_2	Br	CF_3
Cl	Br	NO_2	NO_2	H	NO_2	Cl	CF_3	NO_2	NO_2	Br	NO_2
Cl	Br	OMe	NO_2	H	OMe	Cl	CF_3	OMe	NO_2	Br	OMe
Me	CF_3	Me	Cl	OMe	Me	NO_2	OMe	Me	Br	CF_3	Me
Me	CF_3	F	Cl	OMe	F	NO_2	OMe	F	Br	CF_3	F
Me	CF_3	Cl	Cl	OMe	Cl	NO_2	OMe	Cl	Br	CF_3	Cl
Me	CF_3	Br	Cl	OMe	Br	NO_2	OMe	Br	Br	CF_3	Br
Me	CF_3	CF_3	Cl	OMe	CF_3	NO_2	OMe	CF_3	Br	CF_3	CF_3
Me	CF_3	NO_2	Cl	OMe	NO_2	NO_2	OMe	NO_2	Br	CF_3	NO_2
Me	CF_3	OMe	Cl	OMe	OMe	NO_2	OMe	OMe	Br	CF_3	OMe

T	U	V	T	U	V	T	U	V	T	U	V
F	CF_3	Me	Me	H	Me	NO_2	CF_3	Me	CF_3	CF_3	Me
F	CF_3	F	Me	H	F	NO_2	CF_3	F	CF_3	CF_3	F
F	CF_3	Cl	Me	H	Cl	NO_2	CF_3	Cl	CF_3	CF_3	Cl
F	CF_3	Br	Me	H	Br	NO_2	CF_3	Br	CF_3	CF_3	Br
F	CF_3	CF_3	Me	H	CF_3	NO_2	CF_3	CF_3	CF_3	CF_3	CF_3
F	CF_3	NO_2	Me	H	NO_2	NO_2	CF_3	NO_2	CF_3	CF_3	NO_2
F	CF_3	OMe	Me	H	OMe	NO_2	CF_3	OMe	CF_3	CF_3	OMe

Table 2



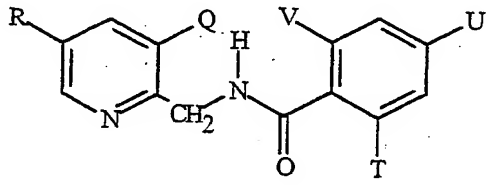
T	U	V	T	U	V	T	U	V	T	U	V
Me	Me	Me	OMe	Me	Me	Cl	NO_2	Me	Br	Me	Me
Me	Me	F	OMe	Me	F	Cl	NO_2	F	Br	Me	F
Me	Me	Cl	OMe	Me	Cl	Cl	NO_2	Cl	Br	Me	Cl
Me	Me	Br	OMe	Me	Br	Cl	NO_2	Br	Br	Me	Br
Me	Me	CF_3	OMe	Me	CF_3	Cl	NO_2	CF_3	Br	Me	CF_3
Me	Me	NO_2	OMe	Me	NO_2	Cl	NO_2	NO_2	Br	Me	NO_2
Me	Me	OMe	OMe	Me	OMe	Cl	NO_2	OMe	Br	Me	OMe
F	Me	Me	OMe	F	Me	CF_3	OMe	Me	CF_3	Me	Me
F	Me	F	OMe	F	F	CF_3	OMe	F	CF_3	Me	F
F	Me	Cl	OMe	F	Cl	CF_3	OMe	Cl	CF_3	Me	Cl
F	Me	Br	OMe	F	Br	CF_3	OMe	Br	CF_3	Me	Br
F	Me	CF_3	OMe	F	CF_3	CF_3	OMe	CF_3	CF_3	Me	CF_3
F	Me	NO_2	OMe	F	NO_2	F	OMe	Me	CF_3	Me	NO_2
F	Me	OMe	OMe	F	OMe	F	OMe	F	CF_3	Me	OMe
Cl	Me	Me	OMe	Cl	Me	F	OMe	Cl	NO_2	Me	Me
Cl	Me	F	OMe	Cl	F	F	OMe	Br	NO_2	Me	F
Cl	Me	Cl	OMe	Cl	Cl	F	OMe	CF_3	NO_2	Me	Cl
Cl	Me	Br	OMe	Cl	Br	F	OMe	NO_2	NO_2	Me	Br
Cl	Me	CF_3	OMe	Cl	CF_3	F	OMe	OMe	NO_2	Me	CF_3
Cl	Me	NO_2	OMe	Cl	NO_2	CF_3	OMe	NO_2	NO_2	Me	NO_2
Cl	Me	OMe	OMe	Cl	OMe	CF_3	OMe	OMe	NO_2	Me	OMe

T	U	V	T	U	V	T	U	V	T	U	V
Me	F	Me	OMe	H	Me	Br	OMe	NO_2	Br	F	Me
Me	F	F	OMe	H	F	Br	OMe	OMe	Br	F	F
Me	F	Cl	OMe	H	Cl	NO_2	NO_2	Me	Br	F	Cl
Me	F	Br	OMe	H	OMe	NO_2	NO_2	F	Br	F	Br
Me	F	CF_3	OMe	OMe	CF_3	NO_2	NO_2	Cl	Br	F	CF_3
Me	F	NO_2	OMe	OMe	NO_2	NO_2	NO_2	Br	Br	F	NO_2
Me	F	OMe	OMe	OMe	OMe	NO_2	NO_2	CF_3	Br	F	OMe
F	F	Me	OMe	Br	Me	NO_2	NO_2	NO_2	CF_3	F	Me
F	F	F	OMe	Br	F	NO_2	NO_2	OMe	CF_3	F	F
F	F	Cl	OMe	Br	Cl	Br	OMe	Me	CF_3	F	Cl
F	F	Br	OMe	Br	Br	Br	OMe	F	CF_3	F	Br
F	F	CF_3	OMe	Br	CF_3	Br	OMe	Cl	CF_3	F	CF_3
F	F	NO_2	OMe	Br	NO_2	Br	OMe	Br	CF_3	F	NO_2
F	F	OMe	OMe	Br	OMe	Br	OMe	CF_3	CF_3	F	OMe
Cl	F	Me	OMe	CF_3	Me	Me	NO_2	Me	NO_2	F	Me
Cl	F	F	OMe	CF_3	F	Me	NO_2	F	NO_2	F	F
Cl	F	Cl	OMe	CF_3	Cl	Me	NO_2	Cl	NO_2	F	Cl
Cl	F	Br	OMe	CF_3	Br	Me	NO_2	Br	NO_2	F	Br
Cl	F	CF_3	OMe	CF_3	CF_3	Me	NO_2	CF_3	NO_2	F	CF_3
Cl	F	NO_2	OMe	CF_3	NO_2	Me	NO_2	NO_2	NO_2	F	NO_2
Cl	F	OMe	OMe	CF_3	OMe	Me	NO_2	OMe	NO_2	F	OMe
Me	Cl	Me	OMe	NO_2	Me	F	NO_2	Me	Br	Cl	Me
Me	Cl	F	OMe	NO_2	F	F	NO_2	F	Br	Cl	F
Me	Cl	Cl	OMe	NO_2	Cl	F	NO_2	Cl	Br	Cl	Cl
Me	Cl	Br	OMe	NO_2	Br	F	NO_2	Br	Br	Cl	Br
Me	Cl	CF_3	OMe	NO_2	CF_3	F	NO_2	CF_3	Br	Cl	CF_3
Me	Cl	NO_2	OMe	NO_2	NO_2	F	NO_2	NO_2	Br	Cl	NO_2
Me	Cl	OMe	OMe	NO_2	OMe	F	NO_2	OMe	Br	Cl	OMe
F	Cl	Me	OMe	H	Br	Br	H	Me	CF_3	Cl	Me
F	Cl	F	OMe	H	CF_3	Br	H	F	CF_3	Cl	F
F	Cl	Cl	OMe	H	NO_2	Br	H	Cl	CF_3	Cl	Cl
F	Cl	Br	OMe	OMe	Me	Br	H	Br	CF_3	Cl	Br
F	Cl	CF_3	OMe	OMe	F	Br	H	CF_3	CF_3	Cl	CF_3
F	Cl	NO_2	OMe	OMe	Cl	Br	H	NO_2	CF_3	Cl	NO_2
F	Cl	OMe	OMe	OMe	Br	Br	H	OMe	CF_3	Cl	OMe
Cl	Cl	Me	F	H	Me	Me	OMe	Me	NO_2	Cl	Me
Cl	Cl	F	F	H	F	Me	OMe	F	NO_2	Cl	F

T	U	V	T	U	V	T	U	V	T	U	V
Cl	Cl	Cl	F	H	Cl	Me	OMe	Cl	NO_2	Cl	Cl
Cl	Cl	Br	F	H	Br	Me	OMe	Br	NO_2	Cl	Br
Cl	Cl	CF_3	F	H	CF_3	Me	OMe	CF_3	NO_2	Cl	CF_3
Cl	Cl	NO_2	F	H	NO_2	Me	OMe	NO_2	NO_2	Cl	NO_2
Cl	Cl	OMe	F	H	OMe	Me	OMe	OMe	NO_2	Cl	OMe
Me	Br	Me	Cl	H	Me	Br	NO_2	Me	Br	Br	Me
Me	Br	F	Cl	H	F	Br	NO_2	F	Br	Br	F
Me	Br	Cl	Cl	H	Cl	Br	NO_2	Cl	Br	Br	Cl
Me	Br	Br	Cl	H	Br	Br	NO_2	Br	Br	Br	Br
Me	Br	CF_3	Cl	H	CF_3	Br	NO_2	CF_3	Br	Br	CF_3
Me	Br	NO_2	Cl	H	NO_2	Br	NO_2	NO_2	Br	Br	NO_2
Me	Br	OMe	Cl	H	OMe	Br	NO_2	OMe	Br	Br	OMe
F	Br	Me	CF_3	H	Me	CF_3	NO_2	Me	CF_3	Br	Me
F	Br	F	CF_3	H	F	CF_3	NO_2	F	CF_3	Br	F
F	Br	Cl	CF_3	H	Cl	CF_3	NO_2	Cl	CF_3	Br	Cl
F	Br	Br	CF_3	H	Br	CF_3	NO_2	Br	CF_3	Br	Br
F	Br	CF_3	CF_3	H	CF_3	CF_3	NO_2	CF_3	CF_3	Br	CF_3
F	Br	NO_2	CF_3	H	NO_2	CF_3	NO_2	NO_2	CF_3	Br	NO_2
F	Br	OMe	CF_3	H	OMe	CF_3	NO_2	OMe	CF_3	Br	OMe
Cl	Br	Me	NO_2	H	Me	Cl	CF_3	Me	NO_2	Br	Me
Cl	Br	F	NO_2	H	F	Cl	CF_3	F	NO_2	Br	F
Cl	Br	Cl	NO_2	H	Cl	Cl	CF_3	Cl	NO_2	Br	Cl
Cl	Br	Br	NO_2	H	Br	Cl	CF_3	Br	NO_2	Br	Br
Cl	Br	CF_3	NO_2	H	CF_3	Cl	CF_3	CF_3	NO_2	Br	CF_3
Cl	Br	NO_2	NO_2	H	NO_2	Cl	CF_3	NO_2	NO_2	Br	NO_2
Cl	Br	OMe	NO_2	H	OMe	Cl	CF_3	OMe	NO_2	Br	OMe
Me	CF_3	Me	Cl	OMe	Me	NO_2	OMe	Me	Br	CF_3	Me
Me	CF_3	F	Cl	OMe	F	NO_2	OMe	F	Br	CF_3	F
Me	CF_3	Cl	Cl	OMe	Cl	NO_2	OMe	Cl	Br	CF_3	Cl
Me	CF_3	Br	Cl	OMe	Br	NO_2	OMe	Br	Br	CF_3	Br
Me	CF_3	CF_3	Cl	OMe	CF_3	NO_2	OMe	CF_3	Br	CF_3	CF_3
Me	CF_3	NO_2	Cl	OMe	NO_2	NO_2	OMe	NO_2	Br	CF_3	NO_2
Me	CF_3	OMe	Cl	OMe	OMe	NO_2	OMe	OMe	Br	CF_3	OMe
F	CF_3	Me	Me	H	Me	NO_2	CF_3	Me	CF_3	CF_3	Me
F	CF_3	F	Me	H	F	NO_2	CF_3	F	CF_3	CF_3	F
F	CF_3	Cl	Me	H	Cl	NO_2	CF_3	Cl	CF_3	CF_3	Cl
F	CF_3	Br	Me	H	Br	NO_2	CF_3	Br	CF_3	CF_3	Br

T	U	V	T	U	V	T	U	V	T	U	V
F	CF_3	CF_3	Me	H	CF_3	NO_2	CF_3	CF_3	CF_3	CF_3	CF_3
F	CF_3	NO_2	Me	H	NO_2	NO_2	CF_3	NO_2	CF_3	CF_3	NO_2
F	CF_3	OMe	Me	H	OMe	NO_2	CF_3	OMe	CF_3	CF_3	OMe

Table 3



T and V are both Cl and U is H

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T and V are both Cl and U is CH_3

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3

T and V are both Cl and U is CH_3

Q	R	Q	R	Q	R	Q	R
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is Cl and V and U are both Me

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is Cl, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$

T is Cl, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is Cl, V is I and U is Me

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

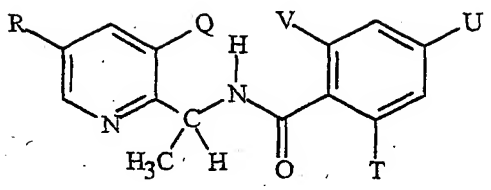
T is F, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is F, V is I and U is Me

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

Table 4



T and V are both Cl and U is H

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T and V are both Cl and U is CH_3

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$

T and V are both Cl and U is CH_3

Q	R	Q	R	Q	R	Q	R
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is Cl and V and U are both Me

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is Cl, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$

T is Cl, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is Cl, V is I and U is Me

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is F, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H

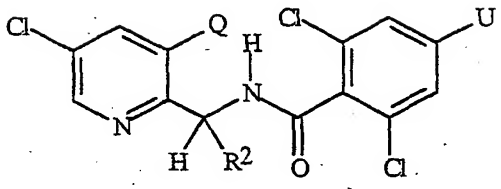
T is F, V is I and U is H

Q	R	Q	R	Q	R	Q	R
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

T is F, V is I and U is Me

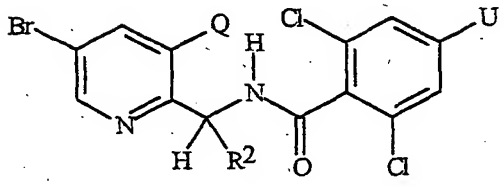
Q	R	Q	R	Q	R	Q	R
Cl	Cl	Cl	OCH_2CF_3	Br	Cl	Br	OCH_2CF_3
Cl	Br	Cl	OCF_2CF_2H	Br	Br	Br	OCF_2CF_2H
Cl	OCF_3	Cl	$OCHFCF_3$	Br	OCF_3	Br	$OCHFCF_3$
Cl	$OCHF_2$	Cl	SCH_2CF_3	Br	$OCHF_2$	Br	SCH_2CF_3
Cl	SCF_3	Cl	SCF_2CF_3	Br	SCF_3	Br	SCF_2CF_3
Cl	$SCHF_2$	Cl	SCF_2CF_2H	Br	$SCHF_2$	Br	SCF_2CF_2H
Cl	$SOCF_3$	Cl	$SOCH_2CF_3$	Br	$SOCF_3$	Br	$SOCH_2CF_3$
Cl	$SOCHF_2$	Cl	$SOCF_2CF_3$	Br	$SOCHF_2$	Br	$SOCF_2CF_3$
Cl	SO_2CF_3	Cl	$SOCF_2CF_2H$	Br	SO_2CF_3	Br	$SOCF_2CF_2H$
Cl	SO_2CHF_2	Cl	$SOCHFCF_3$	Br	SO_2CHF_2	Br	$SOCHFCF_3$
Cl	CN	Cl	$SO_2CH_2CF_3$	Br	CN	Br	$SO_2CH_2CF_3$
Cl	I	Cl	$SO_2CF_2CF_3$	Br	I	Br	$SO_2CF_2CF_3$
Cl	OCH_2F	Cl	$SO_2CF_2CF_2H$	Br	OCH_2F	Br	$SO_2CF_2CF_2H$
Cl	SCH_2F	Cl	SO_2CHFCF_3	Br	SCH_2F	Br	SO_2CHFCF_3
Cl	Et	Cl	OCF_2CF_3	Br	Et	Br	OCF_2CF_3
Cl	OCF_2Cl	Cl	$SCHFCF_3$	Br	OCF_2Cl	Br	$SCHFCF_3$

Table 5



Q	R^2	U	R	R^2	U	R	R^2	U
I	H	H	I	Me	H	I	Me	Me
$OCHF_2$	H	H	$OCHF_2$	Me	H	$OCHF_2$	Me	Me
OCH_2F	H	H	OCH_2F	Me	H	OCH_2F	Me	Me
OCF_2Cl	H	H	OCF_2Cl	Me	H	OCF_2Cl	Me	Me
OCH_2CF_3	H	H	OCH_2CF_3	Me	H	OCH_2CF_3	Me	Me
Et	H	H	Et	Me	H	Et	Me	Me
CN	H	H	CN	Me	H	CN	Me	Me
NH_2	H	H	NH_2	Me	H	NH_2	Me	Me
NHCOMe	H	H	NHCOMe	Me	H	NHCOMe	Me	Me
$NHCOCF_3$	H	H	$NHCOCF_3$	Me	H	$NHCOCF_3$	Me	Me
SCF_3	H	H	SCF_3	Me	H	SCF_3	Me	Me
$SCHF_2$	H	H	$SCHF_2$	Me	H	$SCHF_2$	Me	Me
SCH_2F	H	H	SCH_2F	Me	H	SCH_2F	Me	Me
Ph	H	H	Ph	Me	H	Ph	Me	Me
Me_3Si	H	H	Me_3Si	Me	H	Me_3Si	Me	Me
I	H	Me	Et	H	Me	SCF_3	H	Me
$OCHF_2$	H	Me	CN	H	Me	$SCHF_2$	H	Me
OCH_2F	H	Me	NH_2	H	Me	SCH_2F	H	Me
OCF_2Cl	H	Me	NHCOMe	H	Me	Ph	H	Me
OCH_2CF_3	H	Me	$NHCOCF_3$	H	Me	Me_3Si	H	Me

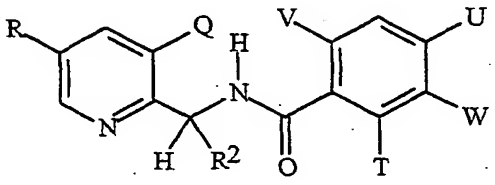
Table 6



Q	R^2	U	R	R^2	U	R	R^2	U
I	H	H	I	Me	H	I	Me	Me

Q	R^2	U	R	R^2	U	R	R^2	U
$OCHF_2$	H	H	$OCHF_2$	Me	H	$OCHF_2$	Me	Me
OCH_2F	H	H	OCH_2F	Me	H	OCH_2F	Me	Me
OCF_2Cl	H	H	OCF_2Cl	Me	H	OCF_2Cl	Me	Me
OCH_2CF_3	H	H	OCH_2CF_3	Me	H	OCH_2CF_3	Me	Me
Et	H	H	Et	Me	H	Et	Me	Me
CN	H	H	CN	Me	H	CN	Me	Me
NH_2	H	H	NH_2	Me	H	NH_2	Me	Me
NHCOMe	H	H	NHCOMe	Me	H	NHCOMe	Me	Me
$NHCOCF_3$	H	H	$NHCOCF_3$	Me	H	$NHCOCF_3$	Me	Me
SCF_3	H	H	SCF_3	Me	H	SCF_3	Me	Me
$SCHF_2$	H	H	$SCHF_2$	Me	H	$SCHF_2$	Me	Me
SCH_2F	H	H	SCH_2F	Me	H	SCH_2F	Me	Me
Ph	H	H	Ph	Me	H	Ph	Me	Me
Me_3Si	H	H	Me_3Si	Me	H	Me_3Si	Me	Me
I	H	Me	Et	H	Me	SCF_3	H	Me
$OCHF_2$	H	Me	CN	H	Me	$SCHF_2$	H	Me
OCH_2F	H	Me	NH_2	H	Me	SCH_2F	H	Me
OCF_2Cl	H	Me	NHCOMe	H	Me	Ph	H	Me
OCH_2CF_3	H	Me	$NHCOCF_3$	H	Me	Me_3Si	H	Me

Table 7



R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Cl	H	Cl	H	H	H	Br	Cl	H	Cl	H	H	H
Cl	Cl	H	NO_2	H	H	H	Br	Cl	H	NO_2	H	H	H
Cl	Cl	H	F	H	H	H	Br	Cl	H	F	H	H	H
Cl	Cl	H	F	F	F	H	Br	Cl	H	F	F	F	H
Cl	Cl	H	F	H	F	H	Br	Cl	H	F	H	F	H
Cl	Cl	H	F	H	Cl	H	Br	Cl	H	F	H	Cl	H
Cl	Cl	H	F	H	Br	H	Br	Cl	H	F	H	Br	H
Cl	Cl	H	F	H	OMe	H	Br	Cl	H	F	H	OMe	H
Cl	Cl	H	F	H	CF_3	H	Br	Cl	H	F	H	CF_3	H

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Cl	H	Cl	H	F	H	Br	Cl	H	Cl	H	F	H
Cl	Cl	H	Cl	H	Br	H	Br	Cl	H	Cl	H	Br	H
Cl	Cl	H	Cl	H	OMe	H	Br	Cl	H	Cl	H	OMe	H
Cl	Cl	H	Cl	H	CF_3	H	Br	Cl	H	Cl	H	CF_3	H
Cl	Cl	H	Br	H	F	H	Br	Cl	H	Br	H	F	H
Cl	Cl	H	Br	H	Cl	H	Br	Cl	H	Br	H	Cl	H
Cl	Cl	H	Br	H	Br	H	Br	Cl	H	Br	H	Br	H
Cl	Cl	H	Br	H	I	H	Br	Cl	H	Br	H	I	H
Cl	Cl	H	Br	H	OMe	H	Br	Cl	H	Br	H	OMe	H
Cl	Cl	H	Br	H	CF_3	H	Br	Cl	H	Br	H	CF_3	H
Cl	Cl	H	I	H	F	H	Br	Cl	H	I	H	F	H
Cl	Cl	H	I	H	Cl	H	Br	Cl	H	I	H	Cl	H
Cl	Cl	H	I	H	Br	H	Br	Cl	H	I	H	Br	H
Cl	Cl	H	I	H	I	H	Br	Cl	H	I	H	I	H
Cl	Cl	H	I	H	OMe	H	Br	Cl	H	I	H	OMe	H
Cl	Cl	H	I	H	CF_3	H	Br	Cl	H	I	H	CF_3	H
Cl	Cl	H	OMe	H	F	H	Br	Cl	H	OMe	H	F	H
Cl	Cl	H	OMe	H	Cl	H	Br	Cl	H	OMe	H	Cl	H
Cl	Cl	H	OMe	H	Br	H	Br	Cl	H	OMe	H	Br	H
Cl	Cl	H	OMe	H	I	H	Br	Cl	H	OMe	H	I	H
Cl	Cl	H	OMe	H	OMe	H	Br	Cl	H	OMe	H	OMe	H
Cl	Cl	H	OMe	H	CF_3	H	Br	Cl	H	OMe	H	CF_3	H
Cl	Cl	H	CF_3	H	F	H	Br	Cl	H	CF_3	H	F	H
Cl	Cl	H	CF_3	H	Cl	H	Br	Cl	H	CF_3	H	Cl	H
Cl	Cl	H	CF_3	H	Br	H	Br	Cl	H	CF_3	H	Br	H
Cl	Cl	H	CF_3	H	I	H	Br	Cl	H	CF_3	H	I	H
Cl	Cl	H	CF_3	H	OMe	H	Br	Cl	H	CF_3	H	OMe	H
Cl	Cl	H	CF_3	H	CF_3	H	Br	Cl	H	CF_3	H	CF_3	H
Cl	Cl	H	Cl	H	H	Me	Br	Cl	H	Cl	H	H	Me
Cl	Cl	H	NO_2	H	H	Me	Br	Cl	H	NO_2	H	H	Me
Cl	Cl	H	F	H	H	Me	Br	Cl	H	F	H	H	Me
Cl	Cl	H	F	F	F	Me	Br	Cl	H	F	F	F	Me
Cl	Cl	H	F	H	F	Me	Br	Cl	H	F	H	F	Me
Cl	Cl	H	F	H	Cl	Me	Br	Cl	H	F	H	Cl	Me
Cl	Cl	H	F	H	Br	Me	Br	Cl	H	F	H	Br	Me
Cl	Cl	H	F	H	OMe	Me	Br	Cl	H	F	H	OMe	Me
Cl	Cl	H	F	H	CF_3	Me	Br	Cl	H	F	H	CF_3	Me

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Cl	H	Cl	H	F	Me	Br	Cl	H	Cl	H	F	Me
Cl	Cl	H	Cl	H	Br	Me	Br	Cl	H	Cl	H	Br	Me
Cl	Cl	H	Cl	H	OMe	Me	Br	Cl	H	Cl	H	OMe	Me
Cl	Cl	H	Cl	H	CF_3	Me	Br	Cl	H	Cl	H	CF_3	Me
Cl	Cl	H	Br	H	F	Me	Br	Cl	H	Br	H	F	Me
Cl	Cl	H	Br	H	Cl	Me	Br	Cl	H	Br	H	Cl	Me
Cl	Cl	H	Br	H	Br	Me	Br	Cl	H	Br	H	Br	Me
Cl	Cl	H	Br	H	I	Me	Br	Cl	H	Br	H	I	Me
Cl	Cl	H	Br	H	OMe	Me	Br	Cl	H	Br	H	OMe	Me
Cl	Cl	H	Br	H	CF_3	Me	Br	Cl	H	Br	H	CF_3	Me
Cl	Cl	H	I	H	F	Me	Br	Cl	H	I	H	F	Me
Cl	Cl	H	I	H	Cl	Me	Br	Cl	H	I	H	Cl	Me
Cl	Cl	H	I	H	Br	Me	Br	Cl	H	I	H	Br	Me
Cl	Cl	H	I	H	I	Me	Br	Cl	H	I	H	I	Me
Cl	Cl	H	I	H	OMe	Me	Br	Cl	H	I	H	OMe	Me
Cl	Cl	H	I	H	CF_3	Me	Br	Cl	H	I	H	CF_3	Me
Cl	Cl	H	OMe	H	F	Me	Br	Cl	H	OMe	H	F	Me
Cl	Cl	H	OMe	H	Cl	Me	Br	Cl	H	OMe	H	Cl	Me
Cl	Cl	H	OMe	H	Br	Me	Br	Cl	H	OMe	H	Br	Me
Cl	Cl	H	OMe	H	I	Me	Br	Cl	H	OMe	H	I	Me
Cl	Cl	H	OMe	H	OMe	Me	Br	Cl	H	OMe	H	OMe	Me
Cl	Cl	H	OMe	H	CF_3	Me	Br	Cl	H	OMe	H	CF_3	Me
Cl	Cl	H	CF_3	H	F	Me	Br	Cl	H	CF_3	H	F	Me
Cl	Cl	H	CF_3	H	Cl	Me	Br	Cl	H	CF_3	H	Cl	Me
Cl	Cl	H	CF_3	H	Br	Me	Br	Cl	H	CF_3	H	Br	Me
Cl	Cl	H	CF_3	H	I	Me	Br	Cl	H	CF_3	H	I	Me
Cl	Cl	H	CF_3	H	OMe	Me	Br	Cl	H	CF_3	H	OMe	Me
Cl	Cl	H	CF_3	H	CF_3	Me	Br	Cl	H	CF_3	H	CF_3	Me
Cl	Cl	Me	Cl	H	H	H	Br	Cl	Me	Cl	H	H	H
Cl	Cl	Me	NO_2	H	H	H	Br	Cl	Me	NO_2	H	H	H
Cl	Cl	Me	F	H	H	H	Br	Cl	Me	F	H	H	H
Cl	Cl	Me	F	F	F	H	Br	Cl	Me	F	F	F	H
Cl	Cl	Me	F	H	F	H	Br	Cl	Me	F	H	F	H
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Cl	Cl	Me	F	H	Br	H	Br	Cl	Me	F	H	Br	H
Cl	Cl	Me	F	H	OMe	H	Br	Cl	Me	F	H	OMe	H
Cl	Cl	Me	F	H	CF_3	H	Br	Cl	Me	F	H	CF_3	H

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Cl	Me	Cl	H	F	H	Br	Cl	Me	Cl	H	F	H
Cl	Cl	Me	Cl	H	Br	H	Br	Cl	Me	Cl	H	Br	H
Cl	Cl	Me	Cl	H	OMe	H	Br	Cl	Me	Cl	H	OMe	H
Cl	Cl	Me	Cl	H	CF_3	H	Br	Cl	Me	Cl	H	CF_3	H
Cl	Cl	Me	Br	H	F	H	Br	Cl	Me	Br	H	F	H
Cl	Cl	Me	Br	H	Cl	H	Br	Cl	Me	Br	H	Cl	H
Cl	Cl	Me	Br	H	Br	H	Br	Cl	Me	Br	H	Br	H
Cl	Cl	Me	Br	H	I	H	Br	Cl	Me	Br	H	I	H
Cl	Cl	Me	Br	H	OMe	H	Br	Cl	Me	Br	H	OMe	H
Cl	Cl	Me	Br	H	CF_3	H	Br	Cl	Me	Br	H	CF_3	H
Cl	Cl	Me	I	H	F	H	Br	Cl	Me	I	H	F	H
Cl	Cl	Me	I	H	Cl	H	Br	Cl	Me	I	H	Cl	H
Cl	Cl	Me	I	H	Br	H	Br	Cl	Me	I	H	Br	H
Cl	Cl	Me	I	H	I	H	Br	Cl	Me	I	H	I	H
Cl	Cl	Me	I	H	OMe	H	Br	Cl	Me	I	H	OMe	H
Cl	Cl	Me	I	H	CF_3	H	Br	Cl	Me	I	H	CF_3	H
Cl	Cl	Me	OMe	H	F	H	Br	Cl	Me	OMe	H	F	H
Cl	Cl	Me	OMe	H	Cl	H	Br	Cl	Me	OMe	H	Cl	H
Cl	Cl	Me	OMe	H	Br	H	Br	Cl	Me	OMe	H	Br	H
Cl	Cl	Me	OMe	H	I	H	Br	Cl	Me	OMe	H	I	H
Cl	Cl	Me	OMe	H	OMe	H	Br	Cl	Me	OMe	H	OMe	H
Cl	Cl	Me	OMe	H	CF_3	H	Br	Cl	Me	OMe	H	CF_3	H
Cl	Cl	Me	CF_3	H	F	H	Br	Cl	Me	CF_3	H	F	H
Cl	Cl	Me	CF_3	H	Cl	H	Br	Cl	Me	CF_3	H	Cl	H
Cl	Cl	Me	CF_3	H	Br	H	Br	Cl	Me	CF_3	H	Br	H
Cl	Cl	Me	CF_3	H	I	H	Br	Cl	Me	CF_3	H	I	H
Cl	Cl	Me	CF_3	H	OMe	H	Br	Cl	Me	CF_3	H	OMe	H
Cl	Cl	Me	CF_3	H	CF_3	H	Br	Cl	Me	CF_3	H	CF_3	H
Cl	Cl	Me	Cl	H	H	Me	Br	Cl	Me	Cl	H	H	Me
Cl	Cl	Me	NO_2	H	H	Me	Br	Cl	Me	NO_2	H	H	Me
Cl	Cl	Me	F	H	H	Me	Br	Cl	Me	F	H	H	Me
Cl	Cl	Me	F	F	F	Me	Br	Cl	Me	F	F	F	Me
Cl	Cl	Me	F	H	F	Me	Br	Cl	Me	F	H	F	Me
Cl	Cl	Me	F	H	Cl	Me	Br	Cl	Me	F	H	Cl	Me
Cl	Cl	Me	F	H	Br	Me	Br	Cl	Me	F	H	Br	Me
Cl	Cl	Me	F	H	OMe	Me	Br	Cl	Me	F	H	OMe	Me
Cl	Cl	Me	F	H	CF3	Me	Br	Cl	Me	F	H	CF_3	Me

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Cl	Me	Cl	H	F	Me	Br	Cl	Me	Cl	H	F	Me
Cl	Cl	Me	Cl	H	Br	Me	Br	Cl	Me	Cl	H	Br	Me
Cl	Cl	Me	Cl	H	OMe	Me	Br	Cl	Me	Cl	H	OMe	Me
Cl	Cl	Me	Cl	H	CF_3	Me	Br	Cl	Me	Cl	H	CF_3	Me
Cl	Cl	Me	Br	H	F	Me	Br	Cl	Me	Br	H	F	Me
Cl	Cl	Me	Br	H	Cl	Me	Br	Cl	Me	Br	H	Cl	Me
Cl	Cl	Me	Br	H	Br	Me	Br	Cl	Me	Br	H	Br	Me
Cl	Cl	Me	Br	H	I	Me	Br	Cl	Me	Br	H	I	Me
Cl	Cl	Me	Br	H	OMe	Me	Br	Cl	Me	Br	H	OMe	Me
Cl	Cl	Me	Br	H	CF_3	Me	Br	Cl	Me	Br	H	CF_3	Me
Cl	Cl	Me	I	H	F	Me	Br	Cl	Me	I	H	F	Me
Cl	Cl	Me	I	H	Cl	Me	Br	Cl	Me	I	H	Cl	Me
Cl	Cl	Me	I	H	Br	Me	Br	Cl	Me	I	H	Br	Me
Cl	Cl	Me	I	H	I	Me	Br	Cl	Me	I	H	I	Me
Cl	Cl	Me	I	H	OMe	Me	Br	Cl	Me	I	H	OMe	Me
Cl	Cl	Me	I	H	CF_3	Me	Br	Cl	Me	I	H	CF_3	Me
Cl	Cl	Me	OMe	H	F	Me	Br	Cl	Me	OMe	H	F	Me
Cl	Cl	Me	OMe	H	Cl	Me	Br	Cl	Me	OMe	H	Cl	Me
Cl	Cl	Me	OMe	H	Br	Me	Br	Cl	Me	OMe	H	Br	Me
Cl	Cl	Me	OMe	H	I	Me	Br	Cl	Me	OMe	H	I	Me
Cl	Cl	Me	OMe	H	OMe	Me	Br	Cl	Me	OMe	H	OMe	Me
Cl	Cl	Me	OMe	H	CF_3	Me	Br	Cl	Me	OMe	H	CF_3	Me
Cl	Cl	Me	CF_3	H	F	Me	Br	Cl	Me	CF_3	H	F	Me
Cl	Cl	Me	CF_3	H	Cl	Me	Br	Cl	Me	CF_3	H	Cl	Me
Cl	Cl	Me	CF_3	H	Br	Me	Br	Cl	Me	CF_3	H	Br	Me
Cl	Cl	Me	CF_3	H	I	Me	Br	Cl	Me	CF_3	H	I	Me
Cl	Cl	Me	CF_3	H	OMe	Me	Br	Cl	Me	CF_3	H	OMe	Me
Cl	Cl	Me	CF_3	H	CF_3	Me	Br	Cl	Me	CF_3	H	CF_3	Me
Cl	Br	H	Cl	H	H	H	Br	Br	H	Cl	H	H	H
Cl	Br	H	NO_2	H	H	H	Br	Br	H	NO_2	H	H	H
Cl	Br	H	F	H	H	H	Br	Br	H	F	H	H	H
Cl	Br	H	F	F	F	H	Br	Br	H	F	F	F	H
Cl	Br	H	F	H	F	H	Br	Br	H	F	H	F	H
Cl	Br	H	F	H	Cl	H	Br	Br	H	F	H	Cl	H
Cl	Br	H	F	H	Br	H	Br	Br	H	F	H	Br	H
Cl	Br	H	F	H	OMe	H	Br	Br	H	F	H	OMe	H
Cl	Br	H	F	H	CF_3	H	Br	Br	H	F	H	CF_3	H

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Br	H	Cl	H	F	H	Br	Br	H	Cl	H	F	H
Cl	Br	H	Cl	H	Br	H	Br	Br	H	Cl	H	Br	H
Cl	Br	H	Cl	H	OMe	H	Br	Br	H	Cl	H	OMe	H
Cl	Br	H	Cl	H	CF_3	H	Br	Br	H	Cl	H	CF_3	H
Cl	Br	H	Br	H	F	H	Br	Br	H	Br	H	F	H
Cl	Br	H	Br	H	Cl	H	Br	Br	H	Br	H	Cl	H
Cl	Br	H	Br	H	Br	H	Br	Br	H	Br	H	Br	H
Cl	Br	H	Br	H	I	H	Br	Br	H	Br	H	I	H
Cl	Br	H	Br	H	OMe	H	Br	Br	H	Br	H	OMe	H
Cl	Br	H	Br	H	CF_3	H	Br	Br	H	Br	H	CF_3	H
Cl	Br	H	I	H	F	H	Br	Br	H	I	H	F	H
Cl	Br	H	I	H	Cl	H	Br	Br	H	I	H	Cl	H
Cl	Br	H	I	H	Br	H	Br	Br	H	I	H	Br	H
Cl	Br	H	I	H	I	H	Br	Br	H	I	H	I	H
Cl	Br	H	I	H	OMe	H	Br	Br	H	I	H	OMe	H
Cl	Br	H	I	H	CF_3	H	Br	Br	H	I	H	CF_3	H
Cl	Br	H	OMe	H	F	H	Br	Br	H	OMe	H	F	H
Cl	Br	H	OMe	H	Cl	H	Br	Br	H	OMe	H	Cl	H
Cl	Br	H	OMe	H	Br	H	Br	Br	H	OMe	H	Br	H
Cl	Br	H	OMe	H	I	H	Br	Br	H	OMe	H	I	H
Cl	Br	H	OMe	H	OMe	H	Br	Br	H	OMe	H	OMe	H
Cl	Br	H	OMe	H	CF_3	H	Br	Br	H	OMe	H	CF_3	H
Cl	Br	H	CF_3	H	F	H	Br	Br	H	CF_3	H	F	H
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Cl	Br	H	CF_3	H	I	H	Br	Br	H	CF_3	H	I	H
Cl	Br	H	CF_3	H	OMe	H	Br	Br	H	CF_3	H	OMe	H
Cl	Br	H	CF_3	H	CF_3	H	Br	Br	H	CF_3	H	CF_3	H
Cl	Br	H	Cl	H	H	Me	Br	Br	H	Cl	H	H	Me
Cl	Br	H	NO_2	H	H	Me	Br	Br	H	NO_2	H	H	Me
Cl	Br	H	F	H	H	Me	Br	Br	H	F	H	H	Me
Cl	Br	H	F	F	F	Me	Br	Br	H	F	F	F	Me
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Cl	Br	H	F	H	Br	Me	Br	Br	H	F	H	Br	Me
Cl	Br	H	F	H	OMe	Me	Br	Br	H	F	H	OMe	Me
Cl	Br	H	F	H	CF_3	Me	Br	Br	H	F	H	CF_3	Me

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Br	H	Cl	H	F	Me	Br	Br	H	Cl	H	F	Me
Cl	Br	H	Cl	H	Br	Me	Br	Br	H	Cl	H	Br	Me
Cl	Br	H	Cl	H	OMe	Me	Br	Br	H	Cl	H	OMe	Me
Cl	Br	H	Cl	H	CF_3	Me	Br	Br	H	Cl	H	CF_3	Me
Cl	Br	H	Br	H	F	Me	Br	Br	H	Br	H	F	Me
Cl	Br	H	Br	H	Cl	Me	Br	Br	H	Br	H	Cl	Me
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Cl	Br	H	Br	H	I	Me	Br	Br	H	Br	H	I	Me
Cl	Br	H	Br	H	OMe	Me	Br	Br	H	Br	H	OMe	Me
Cl	Br	H	Br	H	CF_3	Me	Br	Br	H	Br	H	CF_3	Me
Cl	Br	H	I	H	F	Me	Br	Br	H	I	H	F	Me
Cl	Br	H	I	H	Cl	Me	Br	Br	H	I	H	Cl	Me
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Cl	Br	H	I	H	I	Me	Br	Br	H	I	H	I	Me
Cl	Br	H	I	H	OMe	Me	Br	Br	H	I	H	OMe	Me
Cl	Br	H	I	H	CF_3	Me	Br	Br	H	I	H	CF_3	Me
Cl	Br	H	OMe	H	F	Me	Br	Br	H	OMe	H	F	Me
Cl	Br	H	OMe	H	Cl	Me	Br	Br	H	OMe	H	Cl	Me
Cl	Br	H	OMe	H	Br	Me	Br	Br	H	OMe	H	Br	Me
Cl	Br	H	OMe	H	I	Me	Br	Br	H	OMe	H	I	Me
Cl	Br	H	OMe	H	OMe	Me	Br	Br	H	OMe	H	OMe	Me
Cl	Br	H	OMe	H	CF_3	Me	Br	Br	H	OMe	H	CF_3	Me
Cl	Br	H	CF_3	H	F	Me	Br	Br	H	CF_3	H	F	Me
Cl	Br	H	CF_3	H	Cl	Me	Br	Br	H	CF_3	H	Cl	Me
Cl	Br	H	CF_3	H	Br	Me	Br	Br	H	CF_3	H	Br	Me
Cl	Br	H	CF_3	H	I	Me	Br	Br	H	CF_3	H	I	Me
Cl	Br	H	CF_3	H	OMe	Me	Br	Br	H	CF_3	H	OMe	Me
Cl	Br	H	CF_3	H	CF_3	Me	Br	Br	H	CF_3	H	CF_3	Me
Cl	Br	Me	Cl	H	H	H	Br	Br	Me	Cl	H	H	H
Cl	Br	Me	NO_2	H	H	H	Br	Br	Me	NO_2	H	H	H
Cl	Br	Me	F	H	H	H	Br	Br	Me	F	H	H	H
Cl	Br	Me	F	F	F	H	Br	Br	Me	F	F	F	H
Cl	Br	Me	F	H	F	H	Br	Br	Me	F	H	F	H
Cl	Br	Me	F	H	Cl	H	Br	Br	Me	F	H	Cl	H
Cl	Br	Me	F	H	Br	H	Br	Br	Me	F	H	Br	H
Cl	Br	Me	F	H	OMe	H	Br	Br	Me	F	H	OMe	H
Cl	Br	Me	F	H	CF_3	H	Br	Br	Me	F	H	CF_3	H

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Br	Me	Cl	H	F	H	Br	Br	Me	Cl	H	F	H
Cl	Br	Me	Cl	H	Br	H	Br	Br	Me	Cl	H	Br	H
Cl	Br	Me	Cl	H	OMe	H	Br	Br	Me	Cl	H	OMe	H
Cl	Br	Me	Cl	H	CF_3	H	Br	Br	Me	Cl	H	CF_3	H
Cl	Br	Me	Br	H	F	H	Br	Br	Me	Br	H	F	H
Cl	Br	Me	Br	H	Cl	H	Br	Br	Me	Br	H	Cl	H
Cl	Br	Me	Br	H	Br	H	Br	Br	Me	Br	H	Br	H
Cl	Br	Me	Br	H	I	H	Br	Br	Me	Br	H	I	H
Cl	Br	Me	Br	H	OMe	H	Br	Br	Me	Br	H	OMe	H
Cl	Br	Me	Br	H	CF_3	H	Br	Br	Me	Br	H	CF_3	H
Cl	Br	Me	I	H	F	H	Br	Br	Me	I	H	F	H
Cl	Br	Me	I	H	Cl	H	Br	Br	Me	I	H	Cl	H
Cl	Br	Me	I	H	Br	H	Br	Br	Me	I	H	Br	H
Cl	Br	Me	I	H	I	H	Br	Br	Me	I	H	I	H
Cl	Br	Me	I	H	OMe	H	Br	Br	Me	I	H	OMe	H
Cl	Br	Me	I	H	CF_3	H	Br	Br	Me	I	H	CF_3	H
Cl	Br	Me	OMe	H	F	H	Br	Br	Me	OMe	H	F	H
Cl	Br	Me	OMe	H	Cl	H	Br	Br	Me	OMe	H	Cl	H
Cl	Br	Me	OMe	H	Br	H	Br	Br	Me	OMe	H	Br	H
Cl	Br	Me	OMe	H	I	H	Br	Br	Me	OMe	H	I	H
Cl	Br	Me	OMe	H	OMe	H	Br	Br	Me	OMe	H	OMe	H
Cl	Br	Me	OMe	H	CF_3	H	Br	Br	Me	OMe	H	CF_3	H
Cl	Br	Me	CF_3	H	F	H	Br	Br	Me	CF_3	H	F	H
Cl	Br	Me	CF_3	H	Cl	H	Br	Br	Me	CF_3	H	Cl	H
Cl	Br	Me	CF_3	H	Br	H	Br	Br	Me	CF_3	H	Br	H
Cl	Br	Me	CF_3	H	I	H	Br	Br	Me	CF_3	H	I	H
Cl	Br	Me	CF_3	H	OMe	H	Br	Br	Me	CF_3	H	OMe	H
Cl	Br	Me	CF_3	H	CF_3	H	Br	Br	Me	CF_3	H	CF_3	H
Cl	Br	Me	Cl	H	H	Me	Br	Br	Me	Cl	H	H	Me
Cl	Br	Me	NO_2	H	H	Me	Br	Br	Me	NO_2	H	H	Me
Cl	Br	Me	F	H	H	Me	Br	Br	Me	F	H	H	Me
Cl	Br	Me	F	F	F	Me	Br	Br	Me	F	F	F	Me
Cl	Br	Me	F	H	F	Me	Br	Br	Me	F	H	F	Me
Cl	Br	Me	F	H	Cl	Me	Br	Br	Me	F	H	Cl	Me
Cl	Br	Me	F	H	Br	Me	Br	Br	Me	F	H	Br	Me
Cl	Br	Me	F	H	OMe	Me	Br	Br	Me	F	H	OMe	Me
Cl	Br	Me	F	H	CF_3	Me	Br	Br	Me	F	H	CF_3	Me

R	Q	R^2	T	W	V	U	R	Q	R^2	T	W	V	U
Cl	Br	Me	Cl	H	F	Me	Br	Br	Me	Cl	H	F	Me
Cl	Br	Me	Cl	H	Br	Me	Br	Br	Me	Cl	H	Br	Me
Cl	Br	Me	Cl	H	OMe	Me	Br	Br	Me	Cl	H	OMe	Me
Cl	Br	Me	Cl	H	CF_3	Me	Br	Br	Me	Cl	H	CF_3	Me
Cl	Br	Me	Br	H	F	Me	Br	Br	Me	Br	H	F	Me
Cl	Br	Me	Br	H	Cl	Me	Br	Br	Me	Br	H	Cl	Me
Cl	Br	Me	Br	H	Br	Me	Br	Br	Me	Br	H	Br	Me
Cl	Br	Me	Br	H	I	Me	Br	Br	Me	Br	H	I	Me
Cl	Br	Me	Br	H	OMe	Me	Br	Br	Me	Br	H	OMe	Me
Cl	Br	Me	Br	H	CF_3	Me	Br	Br	Me	Br	H	CF_3	Me
Cl	Br	Me	I	H	F	Me	Br	Br	Me	I	H	F	Me
Cl	Br	Me	I	H	Cl	Me	Br	Br	Me	I	H	Cl	Me
Cl	Br	Me	I	H	Br	Me	Br	Br	Me	I	H	Br	Me
Cl	Br	Me	I	H	I	Me	Br	Br	Me	I	H	I	Me
Cl	Br	Me	I	H	OMe	Me	Br	Br	Me	I	H	OMe	Me
Cl	Br	Me	I	H	CF_3	Me	Br	Br	Me	I	H	CF_3	Me
Cl	Br	Me	OMe	H	F	Me	Br	Br	Me	OMe	H	F	Me
Cl	Br	Me	OMe	H	Cl	Me	Br	Br	Me	OMe	H	Cl	Me
Cl	Br	Me	OMe	H	Br	Me	Br	Br	Me	OMe	H	Br	Me
Cl	Br	Me	OMe	H	I	Me	Br	Br	Me	OMe	H	I	Me
Cl	Br	Me	OMe	H	OMe	Me	Br	Br	Me	OMe	H	OMe	Me
Cl	Br	Me	OMe	H	CF_3	Me	Br	Br	Me	OMe	H	CF_3	Me
Cl	Br	Me	CF_3	H	F	Me	Br	Br	Me	CF_3	H	F	Me
Cl	Br	Me	CF_3	H	Cl	Me	Br	Br	Me	CF_3	H	Cl	Me
Cl	Br	Me	CF_3	H	Br	Me	Br	Br	Me	CF_3	H	Br	Me
Cl	Br	Me	CF_3	H	I	Me	Br	Br	Me	CF_3	H	I	Me
Cl	Br	Me	CF_3	H	OMe	Me	Br	Br	Me	CF_3	H	OMe	Me
Cl	Br	Me	CF_3	H	CF_3	Me	Br	Br	Me	CF_3	H	CF_3	Me

The fungicides of component (b) of the compositions of the invention are selected from the group consisting of

(b1) alkylenebis(dithiocarbamate) fungicides;

(b2) compounds acting at the bc_1 complex of the fungal mitochondrial respiratory electron transfer site;

(b3) cymoxanil;

(b4) compounds acting at the demethylase enzyme of the sterol biosynthesis pathway;

(b5) morpholine and piperidine compounds that act on the sterol biosynthesis pathway;

(b6) phenylamide fungicides;

(b7) pyrimidinone fungicides;

(b8) phthalimides; and

(b9) fosetyl-aluminum.

The weight ratios of component (b) to component (a) typically is from 100:1 to 1:100, preferably is from 30:1 to 1:30, and more preferably is from 10:1 to 1:10. Of note are compositions wherein the weight ratio of component (b) to component (a) is from 10:1 to 1:1. Included are compositions wherein the weight ratio of component (b) to component (a) is from 9:1 to 4.5:1.

The bc_1 Complex Fungicides (component (b2))

Strobilurin fungicides such as azoxystrobin, kresoxim-methyl, metominostrobin/fenominostrobin (SSF-126), picoxystrobin, pyraclostrobin and trifloxystrobin are known to have a fungicidal mode of action which inhibits the bc_1 complex in the mitochondrial respiration chain (*Angew. Chem. Int. Ed.*, **1999**, *38*, 1328-1349). Methyl (*E*)-2-[[6-(2-cyanophenoxy)-4-pyrimidinyl]oxy]-α-(methoxyimino)benzeneacetate (also known as azoxystrobin) is described as a bc_1 complex inhibitor in *Biochemical Society Transactions* **1993**, *22*, 68S. Methyl (*E*)-α-(methoxyimino)-2-[(2-methylphenoxy)methyl]benzeneacetate (also known as kresoxim-methyl) is described as a bc_1 complex inhibitor in *Biochemical Society Transactions* **1993**, *22*, 64S. (*E*)-2-[(2,5-Dimethylphenoxy)methyl]-α-(methoxyimino)-*N*-methylbenzeneacetamide is described as a bc_1 complex inhibitor in *Biochemistry and Cell Biology* **1995**, *85*(3), 306-311. Other compounds that inhibit the bc_1 complex in the mitochondrial respiration chain include famoxadone and fenamidone.

The bc_1 complex is sometimes referred to by other names in the biochemical literature, including complex III of the electron transfer chain, and ubihydroquinone:cytochrome c oxidoreductase. It is uniquely identified by the Enzyme Commission number EC1.10.2.2. The bc_1 complex is described in, for example, *J. Biol. Chem.* **1989**, *264*, 14543-38; *Methods Enzymol.* **1986**, *126*, 253-71; and references cited therein.

The Sterol Biosynthesis Inhibitor Fungicides (component (b4) or (b5))

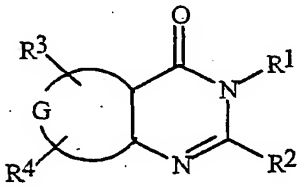
The class of sterol biosynthesis inhibitors includes DMI and non-DMI compounds, that control fungi by inhibiting enzymes in the sterol biosynthesis pathway. DMI fungicides have a common site of action within the fungal sterol biosynthesis pathway; that is, an inhibition of demethylation at position 14 of lanosterol or 24-methylene dihydrolanosterol, which are precursors to sterols in fungi. Compounds acting at this site are often referred to as demethylase inhibitors, DMI fungicides, or DMIs. The demethylase enzyme is sometimes referred to by other names in the biochemical literature, including cytochrome P-450 (14DM). The demethylase enzyme is described in, for example, *J. Biol. Chem.* **1992**, *267*, 13175-79 and references cited therein. DMI fungicides fall into several classes: azoles

(including triazoles and imidazoles), pyrimidines, piperazines and pyridines. The triazoles includes bromuconazole, cyproconazole, difenoconazole, diniconazole, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, ipconazole, metconazole, penconazole, propiconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triticonazole and uniconazole. The imidazoles include clotrimazole, econazole, imazalil, isoconazole, miconazole and prochloraz. The pyrimidines include fenarimol, nuarimol and triarimol. The piperazines include triforine. The pyridines include buthiobate and pyrifenox. Biochemical investigations have shown that all of the above mentioned fungicides are DMI fungicides as described by K. H. Kuck, et al. in *Modern Selective Fungicides - Properties, Applications and Mechanisms of Action,* Lyr, H., Ed.; Gustav Fischer Verlag: New York, 1995, 205-258.

The DMI fungicides have been grouped together to distinguish them from other sterol biosynthesis inhibitors, such as, the morpholine and piperidine fungicides. The morpholines and piperidines are also sterol biosynthesis inhibitors but have been shown to inhibit later steps in the sterol biosynthesis pathway. The morpholines include aldimorph, dodemorph, fenpropimorph, tridemorph and trimorphamide. The piperidines include fenpropidin. Biochemical investigations have shown that all of the above mentioned morpholine and piperidine fungicides are sterol biosynthesis inhibitor fungicides as described by K. H. Kuck, et al. in *Modern Selective Fungicides - Properties, Applications and Mechanisms of Action,* Lyr, H., Ed.; Gustav Fischer Verlag: New York, 1995, 185-204.

Pyrimidinone Fungicides (component (b7))

Pyrimidinone fungicides include compounds of Formula II



II

wherein

G is a fused phenyl, thiophene or pyridine ring;

R^1 is C_1-C_6 alkyl;

R^2 is C_1-C_6 alkyl or C_1-C_6 alkoxy;

R^3 is halogen; and

R^4 is hydrogen or halogen.

Pyrimidinone fungicides are described in International Patent Application WO94/26722, U.S. Patent No. 6,066,638, U.S. Patent No. 6,245,770, U.S. Patent No. 6,262,058 and U.S. Patent No. 6,277,858.

Of note are pyrimidinone fungicides selected from the group:

6-bromo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone,
6,8-diiodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone,
6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone,
6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one,
6-bromo-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one,
7-bromo-2-propoxy-3-propylthieno[3,2-*d*]pyrimidin-4(3*H*)-one,
6-bromo-2-propoxy-3-propylpyrido[2,3-*d*]pyrimidin-4(3*H*)-one,
6,7-dibromo-2-propoxy-3-propylthieno[3,2-*d*]pyrimidin-4(3*H*)-one, and
3-(cyclopropylmethyl)-6-iodo-2-(propylthio)pyrido[2,3-*d*]pyrimidin-4(3*H*)-one.

Table 8

	Examples of component (b)
(b1)	Alkylenebis(dithiocarbamate)s such as mancozeb, maneb, propineb and zineb
(b3)	Cymoxanil
(b6)	Phenylamides such as metalaxyl, benalaxyl and oxadixyl
(b8)	Phthalimids such as folpet or captan
(b9)	Fosetyl-aluminum

Other fungicides which can be included in combination with a Formula I compound or as an additional component in combination with component (a) and component (b) are acibenzolar, benalaxyl, benomyl, blasticidin-S, Bordeaux mixture (tribasic copper sulfate), carpropamid, captafol, captan, carbendazim, chloroneb, chlorothalonil, copper oxychloride, copper salts such as copper sulfate and copper hydroxide, cyazofamid, cymoxanil, cyprodinil, (*S*)-3,5-dichloro-*N*-(3-chloro-1-ethyl-1-methyl- 2-oxopropyl)-4-methylbenzamide (RH 7281), diclocymet (S-2900), diclomezine, dicloran, dimethomorph, diniconazole-M, dodemorph, dodine, edifenphos, fencaramid (SZX0722), fenpiclonil, fentin acetate, fentin hydroxide, fluazinam, fludioxonil, flumetover (RPA 403397), flutolanil, folpet, fosetyl-aluminum, furalaxyl, furametapyr (S-82658), iprobenfos, iprodione, isoprothiolane, iprovalicarb, kasugamycin, mancozeb, maneb, mefenoxam, mepronil, metalaxyl, metiram-zinc, myclobutanil, neo-asozin (ferric methanearsonate), oxadixyl, pencycuron, prochloraz, procymidone, propamocarb, propineb, pyrifenox, pyrimethanil, pyroquilon, quinoxyfen, spiroxamine, sulfur, thifluzamide, thiophanate-methyl, thiram, triadimefon, tricyclazole, validamycin, vinclozolin, zineb and zoxamid.

Descriptions of the commercially available compounds listed above may be found in *The Pesticide Manual, Twelfth Edition*, C.D.S. Tomlin, ed., British Crop Protection Council, 2000.

Of note are combinations of Formula I with fungicides of a different biochemical mode of action (e.g. mitochondrial respiration inhibition, inhibition of protein synthesis by interference of the synthesis of ribosomal RNA or inhibition of beta-tubulin synthesis) that can be particularly advantageous for resistance management. Examples include

combinations of compounds of Formula I (e.g. Compound 1) with strobilurins such as azoxystrobin, kresoxim-methyl, pyraclostrobin and trifloxystrobin; carbendazim, mitochondrial respiration inhibitors such as famoxadone and fenamidone; benomyl, cymoxanil; dimethomorph; folpet; fosetyl-aluminum; metalaxyl; mancozeb and maneb. These combinations can be particularly advantageous for resistance management, especially where the fungicides of the combination control the same or similar diseases.

Of note are combinations of Formula I with fungicides for controlling grape diseases (e.g. *Plasmopara viticola, Botrytis cinerea* and *Uncinula necatur*) including alkylenebis(dithiocarbamate)s such as mancozeb, maneb, propineb and zineb, phthalimids such as folpet, copper salts such as copper sulfate and copper hydroxide, strobilurins such as azoxystrobin, pyraclostrobin and trifloxystrobin, mitochondrial respiration inhibitors such as famoxadone and fenamidone, phenylamides such as metalaxyl, phosphonates such as fosetyl-Al, dimethomorph, pyrimidinone fungicides such as 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone and 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, and other fungicides such as cymoxanil.

Of note are combinations of Formula I with fungicides for controlling potato diseases (e.g. *Phytophthora infestans, Alternaria solani* and *Rhizoctonia solani*) including alkylenebis(dithiocarbamate)s such as mancozeb, maneb, propineb and zineb; copper salts such as copper sulfate and copper hydroxide; strobilurins such as pyraclostrobin and trifloxystrobin; mitochondrial respiration inhibitors such as famoxadone and fenamidone; phenylamides such as metalaxyl; carbamates such as propamocarb; phenylpyridylamines such as fluazinam and other fungicides such as chlorothalonil, cyazofamid, cymoxanil, dimethomorph, zoxamid and iprovalicarb.

Of note are compositions wherein component (b) comprises at least one compound from each of two different groups selected from (b1), (b2), (b3), (b4), (b5), (b6), (b7), (b8) and (b9). The weight ratio of the compound(s) of the first of these two component (b) groups to the compound(s) of the second of these component (b) groups typically is from 100:1 to 1:100, more typically from 30:1 to 1:30 and most typically from 10:1 to 1:10.

Of note are compositions wherein component (b) comprises at least one compound selected from (b1), for example mancozeb, and at least one compound selected from a second component (b) group, for example, from (b2), (b3), (b6), (b7), (b8) or (b9). Of particular note are such compositions wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30 and the weight ratio of component (b1) to component (a) is from 10:1 to 1:1. Included are compositions wherein the weight ratio of component (b1) to component (a) is from 9:1 to 4.5:1. Examples of these compositions include compositions comprising mixtures of component (a) (preferably a compound from Index Table A) with mancozeb and a compound selected from the group consisting of famoxadone, fenamidone, azoxystrobin, kresoxim-methyl, pyraclostrobin, trifloxystrobin, cymoxanil, metalaxyl,

benalaxyl, oxadixyl, 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone, 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, folpet, captan and fosetyl-aluminum.

Also of note are compositions wherein component (b) comprises at least one compound selected from (b2), for example famoxadone, and at least one compound selected from a second component (b) group, for example, from (b1), (b3), (b6), (b7), (b8) or (b9). Of particular note are such compositions wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30 and the weight ratio of component (b2) to component (a) is from 10:1 to 1:1. Included are compositions wherein the weight ratio of component (b2) to component (a) is from 9:1 to 4.5:1. Examples of these compositions include compositions comprising mixtures of component (a) (preferably a compound from Index Table A) with famoxadone and a compound selected from the group consisting of mancozeb, maneb, propineb, zineb, cymoxanil, metalaxyl, benalaxyl, oxadixyl, 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone, 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, folpet, captan and fosetyl-aluminum.

Also of note are compositions wherein component (b) comprises the compound of (b3), in other words cymoxanil, and at least one compound selected from a second component (b) group, for example, from (b1), (b2), (b6), (b7), (b8) or (b9). Of particular note are such compositions wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30 and the weight ratio of component (b3) to component (a) is from 10:1 to 1:1. Included are compositions wherein the weight ratio of component (b3) to component (a) is from 9:1 to 4.5:1. Examples of these compositions include compositions comprising mixtures of component (a) (preferably a compound from Index Table A) with cymoxanil and a compound selected from the group consisting of famoxadone, fenamidone, azoxystrobin, kresoxim-methyl, pyraclostrobin, trifloxystrobin, mancozeb, maneb, propineb, zineb, metalaxyl, benalaxyl, oxadixyl, 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone, 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, folpet, captan and fosetyl-aluminum.

Also of note are compositions wherein component (b) comprises at least one compound selected from (b6), for example metalaxyl, and at least one compound selected from a second component (b) group, for example, from (b1), (b2), (b3), (b7), (b8) or (b9). Of particular note are such compositions wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30 and the weight ratio of component (b6) to component (a) is from 10:1 to 1:3. Included are compositions wherein the weight ratio of component (b6) to component (a) is from 9:1 to 4.5:1. Examples of these compositions include compositions comprising mixtures of component (a) (preferably a compound from Index Table A) with metalaxyl or oxadixyl and a compound selected from the group consisting of famoxadone, fenamidone, azoxystrobin, kresoxim-methyl, pyraclostrobin, trifloxystrobin, cymoxanil, mancozeb, maneb, propineb, zineb, 6-iodo-3-propyl-

2-propyloxy-4(3*H*)-quinazolinone, 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, folpet, captan and fosetyl-aluminum.

Also of note are compositions wherein component (b) comprises at least one compound selected from (b7), for example 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone or 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, and at least one compound selected from a second component (b) group, for example, from (b1), (b2), (b3), (b6), (b8) or (b9). Of particular note are such compositions wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30 and the weight ratio of component (b7) to component (a) is from 1:1 to 1:20. Included are compositions wherein the weight ratio of component (b6) to component (a) is from 1:4.5 to 1:9. Examples of these compositions include compositions comprising mixtures of component (a) (preferably a compound from Index Table A) with 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone or 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one and a compound selected from the group consisting of famoxadone, fenamidone, azoxystrobin, kresoxim-methyl, pyraclostrobin, trifloxystrobin, cymoxanil, mancozeb, maneb, propineb, zineb, metalaxyl, benalaxyl, oxadixyl, folpet, captan and fosetyl-aluminum.

Also of note are compositions wherein component (b) comprises the compound of (b9), in other words fosetyl-aluminum, and at least one compound selected from a second component (b) group, for example, from (b1), (b2), (b3), (b6) or (b7). Of particular note are such compositions wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30 and the weight ratio of component (b9) to component (a) is from 10:1 to 1:1. Included are compositions wherein the weight ratio of component (b9) to component (a) is from 9:1 to 4.5:1. Examples of these compositions include compositions comprising mixtures of component (a) (preferably a compound from Index Table A) with fosetyl-aluminum and a compound selected from the group consisting of famoxadone, fenamidone, azoxystrobin, kresoxim-methyl, pyraclostrobin, trifloxystrobin, mancozeb, maneb, propineb, zineb, metalaxyl, benalaxyl, oxadixyl, 6-iodo-3-propyl-2-propyloxy-4(3*H*)-quinazolinone, 6-chloro-2-propoxy-3-propylthieno[2,3-*d*]pyrimidin-4(3*H*)-one, folpet, captan and cymoxanil.

Of note are combinations of compounds of Formula I with fungicides giving an even broader spectrum of agricultural protection including strobilurins such as azoxystrobin, kresoxim-methyl, pyraclostrobin and trifloxystrobin; morpholines such as fenpropidine and fenpropimorph; triazoles such as bromuconazole, cyproconazole, difenoconazole, epoxyconazole, flusilazole, ipconazole, metconazole, propiconazole, tebuconazole and triticonazole; pyrimidinone fungicides, benomyl; carbendazim; chlorothalonil; dimethomorph; folpet; mancozeb; maneb; quinoxyfen; validamycin and vinclozolin.

Preferred 6. Preferred compositions comprise a compound of component (a) mixed with cymoxanil.

Preferred 7. Preferred compositions comprise a compound of component (a) mixed with a compound selected from (b1). More preferred is a composition wherein the compound of (b1) is mancozeb.

Preferred 8. Preferred compositions comprise a compound of component (a) mixed with a compound selected from (b2). More preferred is a composition wherein the compound of (b2) is famoxadone.

Of particular note are combinations of Compound 1 or 5 with azoxystrobin, combinations of Compound 1 or 5 with kresoxim-methyl, combinations of Compound 1 or 5 with pyrclostrobin, combinations of Compound 1 or 5 with trifloxystrobin, combinations of Compound 1 or 5 with carbendazim, combinations of Compound 1 or 5 with chlorothalonil, combinations of Compound 1 or 5 with dimethomorph, combinations of Compound 1 or 5 with folpet, combinations of Compound 1 or 5 with mancozeb, combinations of Compound 1 or 5 with maneb, combinations of Compound 1 or 5 with quinoxyfen, combinations of Compound 1 or 5 with validamycin, combinations of Compound 1 or 5 with vinclozolin, Compound 1 or 5 with fenpropidine, combinations of Compound 1 or 5 with fenpropimorph, combinations of Compound 1 or 5 with bromuconazole, combinations of Compound 1 or 5 with cyproconazole, combinations of Compound 1 or 5 with difenoconazole, combinations of Compound 1 or 5 with epoxyconazole, combinations of Compound 1 or 5 with flusilazole, combinations of Compound 1 or 5 with ipconazole, combinations of Compound 1 or 5 with metconazole, combinations of Compound 1 or 5 with propiconazole, combinations of Compound 1 or 5 with tebuconazole, combinations of Compound 1 or 5 with triticonazole, combinations of Compound 1 or 5 with famoxadone, combinations of Compound 1 or 5 with fenamidone, combinations of Compound 1 or 5 with benomyl, combinations of Compound 1 or 5 with cymoxanil, combinations of Compound 1 or 5 with fosetyl-aluminum, combinations of Compound 1 or 5 with metalaxyl, combinations of Compound 1 or 5 with propineb, combinations of Compound 1 or 5 with zineb, combinations of Compound 1 or 5 with copper sulfate, combinations of Compound 1 or 5 with copper hydroxide, combinations of Compound 1 or 5 with propamocarb, combinations of Compound 1 or 5 with cyazofamid, combinations of Compound 1 or 5 with zoxamid, combinations of Compound 1 or 5 with fluazinam and combinations of Compound 1 or 5 with iprovalicarb. Compound numbers refer to compounds in Index Table A.

Formulation/Utility

Compositions of this invention will generally be used as a formulation or composition comprising at least one carrier selected from agriculturally suitable liquid diluents, solid diluents and surfactants. The formulation or composition ingredients are selected to be consistent with the physical properties of the active ingredient, mode of application and environmental factors such as soil type, moisture and temperature. Useful formulations include liquids such as solutions (including emulsifiable concentrates), suspensions,

emulsions (including microemulsions and/or suspoemulsions) and the like which optionally can be thickened into gels. Useful formulations further include solids such as dusts, powders, granules, pellets, tablets, films, and the like which can be water-dispersible ("wettable") or water-soluble. Active ingredient can be (micro)encapsulated and further formed into a suspension or solid formulation; alternatively the entire formulation of active ingredient can be encapsulated (or "overcoated"). Encapsulation can control or delay release of the active ingredient. Sprayable formulations can be extended in suitable media and used at spray volumes from about one to several hundred liters per hectare. High-strength compositions are primarily used as intermediates for further formulation.

The formulations will typically contain effective amounts (e.g. from 0.01-99.99 weight percent) of active ingredients together with diluent and/or surfactant within the following approximate ranges which add up to 100 percent by weight.

	Weight Percent		
	Active Ingredients	Diluent	Surfactant
Water-Dispersible and Water-soluble Granules, Tablets and Powders.	5–90	0–94	1–15
Suspensions, Emulsions, Solutions (including Emulsifiable Concentrates)	5–50	40–95	0–25
Dusts	1–25	70–99	0–5
Granules and Pellets	0.01–99	5–99.99	0–15
High Strength Compositions	90–99	0–10	0–2

Typical solid diluents are described in Watkins, et al., *Handbook of Insecticide Dust Diluents and Carriers*, 2nd Ed., Dorland Books, Caldwell, New Jersey. Typical liquid diluents are described in Marsden, *Solvents Guide*, 2nd Ed., Interscience, New York, 1950. *McCutcheon's Detergents and Emulsifiers Annual*, Allured Publ. Corp., Ridgewood, New Jersey, as well as Sisely and Wood, *Encyclopedia of Surface Active Agents*, Chemical Publ. Co., Inc., New York, 1964, list surfactants and recommended uses. All formulations can contain minor amounts of additives to reduce foam, caking, corrosion, microbiological growth and the like, or thickeners to increase viscosity.

Surfactants include, for example, polyethoxylated alcohols, polyethoxylated alkylphenols, polyethoxylated sorbitan fatty acid esters, dialkyl sulfosuccinates, alkyl sulfates, alkylbenzene sulfonates, organosilicones, *N,N*-dialkyltaurates, lignin sulfonates, naphthalene sulfonate formaldehyde condensates, polycarboxylates, and polyoxyethylene/polyoxypropylene block copolymers. Solid diluents include, for example, clays such as bentonite, montmorillonite, attapulgite and kaolin, starch, sugar, silica, talc, diatomaceous earth, urea, calcium carbonate, sodium carbonate and bicarbonate, and sodium sulfate. Liquid diluents include, for example, water, *N,N*-dimethylformamide, dimethyl

sulfoxide, *N*-alkylpyrrolidone, ethylene glycol, polypropylene glycol, paraffins, alkylbenzenes, alkylnaphthalenes, oils of olive, castor, linseed, tung, sesame, corn, peanut, cotton-seed, soybean, rape-seed and coconut, fatty acid esters, ketones such as cyclohexanone, 2-heptanone, isophorone and 4-hydroxy-4-methyl-2-pentanone, and alcohols such as methanol, cyclohexanol, decanol and tetrahydrofurfuryl alcohol.

Solutions, including emulsifiable concentrates, can be prepared by simply mixing the ingredients. Dusts and powders can be prepared by blending and, usually, grinding as in a hammer mill or fluid-energy mill. Suspensions are usually prepared by wet-milling; see, for example, U.S. 3,060,084. Preferred suspension concentrates include those containing, in addition to the active ingredient, from 5 to 20% nonionic surfactant (for example, polyethoxylated fatty alcohols) optionally combined with 50-65% liquid diluents and up to 5% anionic surfactants. Granules and pellets can be prepared by spraying the active material upon preformed granular carriers or by agglomeration techniques. See Browning, "Agglomeration", *Chemical Engineering*, December 4, 1967, pp 147-48, *Perry's Chemical Engineer's Handbook*, 4th Ed., McGraw-Hill, New York, 1963, pages 8-57 and following, and WO 91/13546. Pellets can be prepared as described in U.S. 4,172,714. Water-dispersible and water-soluble granules can be prepared as taught in U.S. 4,144,050, U.S. 3,920,442 and DE 3,246,493. Tablets can be prepared as taught in U.S. 5,180,587, U.S. 5,232,701 and U.S. 5,208,030. Films can be prepared as taught in GB 2,095,558 and U.S. 3,299,566.

For further information regarding the art of formulation, see U.S. 3,235,361, Col. 6, line 16 through Col. 7, line 19 and Examples 10-41; U.S. 3,309,192, Col. 5, line 43 through Col. 7, line 62 and Examples 8, 12, 15, 39, 41, 52, 53, 58, 132, 138-140, 162-164, 166, 167 and 169-182; U.S. 2,891,855, Col. 3, line 66 through Col. 5, line 17 and Examples 1-4; Klingman, *Weed Control as a Science*, John Wiley and Sons, Inc., New York, 1961, pp 81-96; and Hance et al., *Weed Control Handbook*, 8th Ed., Blackwell Scientific Publications, Oxford, 1989.

In the following Examples, all percentages are by weight and all formulations are prepared in conventional ways. Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Percentages are by weight except where otherwise indicated.

Example A

Wettable Powder

Active ingredients		65.0%
dodecylphenol polyethylene glycol ether		2.0%
sodium ligninsulfonate		4.0%
sodium silicoaluminate		6.0%
montmorillonite (calcined)		23.0%.

Example B

Granule

Active ingredients		10.0%
attapulgite granules (low volatile matter, 0.71/0.30 mm; U.S.S. No. 25–50 sieves)		90.0%.

Example C

Extruded Pellet

Active ingredients		25.0%
anhydrous sodium sulfate		10.0%
crude calcium ligninsulfonate		5.0%
sodium alkylnaphthalenesulfonate		1.0%
calcium/magnesium bentonite		59.0%.

Example D

Emulsifiable Concentrate

Active ingredients		20.0%
blend of oil soluble sulfonates and polyoxyethylene ethers		10.0%
isophorone		70.0%.

Example E

Suspension Concentrate

Active ingredients		20.0%
polyethoxylated fatty alcohol	nonionic surfactant	15.0%
ester derivative of montan wax		3.0%
calcium lignosulfonate	anionic surfactant	2.0%
polyethoxylated/polypropoxylated polyglycol block copolymer	surfactant	1.0%
propylene glycol	diluent	6.4%
poly(dimethylsiloxane)	antifoam agent	0.6%
antimicrobial agent		0.1%
water	diluent	51.9%

The formulation ingredients are mixed together as a syrup, the active ingredients are added and the mixture is homogenized in a blender. The resulting slurry is then wet-milled to form a suspension concentrate.

Compositions of this invention can also be mixed with one or more insecticides, nematocides, bactericides, acaricides, growth regulators, chemosterilants, semiochemicals, repellents, attractants, pheromones, feeding stimulants or other biologically active compounds to form a multi-component pesticide giving an even broader spectrum of agricultural protection. Examples of such agricultural protectants with which compositions of this invention can be formulated are: insecticides such as abamectin, acephate, azinphos-methyl, bifenthrin, buprofezin, carbofuran, chlorfenapyr, chlorpyrifos, chlorpyrifos-methyl, cyfluthrin, beta-cyfluthrin, cyhalothrin, lambda-cyhalothrin, deltamethrin, diafenthiuron, diazinon, diflubenzuron, dimethoate, esfenvalerate, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flucythrinate, tau-fluvalinate, fonophos, imidacloprid, isofenphos, malathion, metaldehyde, methamidophos, methidathion, methomyl, methoprene, methoxychlor, methyl 7-chloro-2,5-dihydro-2-[[*N*-(methoxycarbonyl)-*N*-[4-(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-*e*][1,3,4]oxadiazine-4a(3*H*)-carboxylate (indoxacarb), monocrotophos, oxamyl, parathion, parathion-methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, rotenone, sulprofos, tebufenozide, tefluthrin, terbufos, tetrachlorvinphos, thiodicarb, tralomethrin, trichlorfon and triflumuron; bactericides such as streptomycin; acaricides such as amitraz, chinomethionat, chlorobenzilate, cyhexatin, dicofol, dienochlor, etoxazole, fenazaquin, fenbutatin oxide, fenpropathrin, fenpyroximate, hexythiazox, propargite, pyridaben and tebufenpyrad; nematocides such as aldoxycarb and fenamiphos; and biological agents such as *Bacillus thuringiensis*, *Bacillus thuringiensis* delta endotoxin, baculovirus, and entomopathogenic bacteria, virus and fungi. The weight ratios of these various mixing partners to compounds of Formula I of this invention typically are between 100:1 and 1:100, preferably between 30:1 and 1:30, more preferably between 10:1 and 1:10 and most preferably between 4:1 and 1:4.

The compositions of this invention are useful as plant disease control agents. The present invention therefore further comprises a method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof to be protected, or to the plant seed or seedling to be protected, an effective amount of a compound of the invention or a fungicidal composition containing said compound. The compounds and compositions of this invention provide control of diseases caused by a broad spectrum of fungal plant pathogens in the Basidiomycete, Ascomycete, Oomycete and Deuteromycete classes. They are effective in controlling a broad spectrum of plant diseases, particularly foliar pathogens of ornamental, vegetable, field, cereal, and fruit crops. These pathogens include *Plasmopara viticola, Phytophthora infestans, Peronospora tabacina,*

Pseudoperonospora cubensis, Pythium aphanidermatum, Alternaria brassicae, Septoria nodorum, Septoria tritici, Cercosporidium personatum, Cercospora arachidicola, Pseudocercosporella herpotrichoides, Cercospora beticola, Botrytis cinerea, Monilinia fructicola, Pyricularia oryzae, Podosphaera leucotricha, Venturia inaequalis, Erysiphe graminis, Uncinula necatur, Puccinia recondita, Puccinia graminis, Hemileia vastatrix, Puccinia striiformis, Puccinia arachidis, Rhizoctonia solani, Sphaerotheca fuliginea, Fusarium oxysporum, Verticillium dahliae, Pythium aphanidermatum, Phytophthora megasperma, Sclerotinia sclerotiorum, Sclerotium rolfsii, Erysiphe polygoni, Pyrenophora teres, Gaeumannomyces graminis, Rynchosporium secalis, Fusarium roseum, Bremia lactucae and other generea and species closely related to these pathogens. The compositions of the invention are especially effective in controlling *Plasmopara viticola* on grapes and *Phytophthora infestans* on potatoes and tomatoes.

Plant disease control is ordinarily accomplished by applying an effective amount of a compound of this invention either pre- or post-infection, to the portion of the plant to be protected such as the roots, stems, foliage, fruit, seeds, tubers or bulbs, or to the media (soil or sand) in which the plants to be protected are growing. The compounds can also be applied to the seed to protect the seed and seedling.

Rates of application for these compounds can be influenced by many factors of the environment and should be determined under actual use conditions. Foliage can normally be protected when treated at a rate of from less than 1 g/ha to 5,000 g/ha of active ingredient. Seed and seedlings can normally be protected when seed is treated at a rate of from 0.1 to 10 g per kilogram of seed.

Synergism has been described as "the cooperative action of two components of a mixture, such that the total effect is greater or more prolonged than the sum of the effects of the two (or more) taken independently" (see Tames, P. M. L., *Neth. J. Plant Pathology*, **1964**, *70*, 73-80). It is found that compositions containing the compound of Formula I and fungicides with a different mode of action exhibit synergistic effects.

The presence of a synergistic effect between two active ingredients (e.g. componet (a) and component (b)) is established with the aid of the Colby equation (see Colby, S. R. In *Calculating Synergistic and Antagonistic Responses of Herbicide Combinations*, Weeds, **1967**, *15*, 20-22):

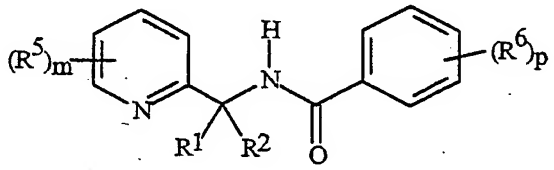
$$p = A + B - \left[\frac{A \times B}{100} \right]$$

Using the methods of Colby, the presence of a synergistic interaction between two active ingredients is established by first calculating the predicted activity, p, of the mixture based on activities of the two components applied alone. If p is lower than the experimentally established effect, synergism has occurred. In the equation above, A is the

fungicidal activity in percentage control of one component applied alone at rate x. The B term is the fungicidal activity in percentage control of the second component applied at rate y. The equation estimates p, the fungicidal activity of the mixture of A at rate x with B at rate y if their effects are strictly additive and no interaction has occurred.

The following TESTS can be used to demonstrate the control efficacy of compositions of this invention on specific pathogens. The pathogen control protection afforded by the compositions is not limited, however, to these species. See Index Tables A for compound designations for component (a) compounds used in the TESTS.

Index Table A



Cmpd No.	$(R^5)_m$	R^1	R^2	$(R^6)_p$	m. p. (° C)
1	3-Cl-5-CF_3	H	H	2,6-di-Cl	164-168
2	3-Cl-5-CF_3	H	CH_3	2,6-di-Cl	
3	3-Cl-5-CF_3	H	H	2,6-di-Cl-4-CH_3	
4	3-Cl-5-CF_3	H	CH_3	2,6-di-Cl-4-CH_3	
5	3,5-di-Cl	H	H	2,6-di-Cl	
6	3,5-di-Cl	H	CH_3	2,6-di-Cl	
7	3,5-di-Cl	H	H	2,6-di-Cl-4-CH_3	
8	3,5-di-Cl	H	CH_3	2,6-di-Cl-4-CH_3	

BIOLOGICAL EXAMPLES OF THE INVENTION

The following TESTS demonstrate the control efficacy of compositions of this invention on specific pathogens. The pathogen control protection afforded by the compounds is not limited, however, to these species.

Test suspensions comprising a single active ingredient are sprayed to demonstrate the control efficacy of the active ingredient individually. To demonstrate the control efficacy of a combination, (a) the active ingredients can be combined in the appropriate amounts in a single test suspension, (b) stock solutions of individual active ingredients can be prepared and then combined in the appropriate ratio, and diluted to the final desired concentration to form a test suspension or (c) test suspensions comprising single active ingredients can be sprayed sequentially in the desired ratio.

Composition 1

Ingredients	Wt.%
Compound 1 Technical Material	20
Polyethoxylated stearyl alcohol	15
Montan wax ester	3
Desugared calcium lignosulfate	2
Polyoxypropylene-polyoxyethylene block copolymer	1
Propylene Glycol	6.4
Polyorganosiloxanes + emulsifying agent	0.6
19% (1,2-benzisothiazolin-3-one) in aqueous dipropylene glycol	0.1
Water	51.9

Composition 2

Ingredients	Wt. %
Famoxadone Technical Material	51.7
Sodium lignosulfate	36.0
Sodium alkylnaphthalene sulfonate	2.0
Polyvinyl pyrrolidone	4.0
Polyoxypropylene-polyoxyethylene block copolymer	3.0
Sodium dodecylbenzene sulfonate	3.0
Fluoroalkyl acid mixture	0.3

Composition 3

Ingredients	Wt. %
Cymoxanil Technical Material	61.9
Sodium alkylnaphthalene sulfonate formaldehyde condensate	5.0
Sodium alkylnaphthalene sulfonate	1.0
Polyvinyl pyrrolidone	4.0
Monosodium phosphate	4.0
Fumaric acid	1.0
Fumed silica	1.0
Sodium	0.2
Sugar	14.0
Sodium lignosulfate	7.9

Test compositions were first mixed with purified water containing 250 ppm of the surfactant Trem® 014 (polyhydric alcohol esters). The resulting test suspensions were then used in the following tests. Test suspensions were sprayed to the point of run-off on the test plants at the equivalent rates of 5, 10, 20, 25, 50 or 100 g/ha of active ingredient. Spraying a 40 ppm test suspension to the point of run-off on the test plants is the equivalent of a rate of

100 g/ha. The tests were replicated three times and the results reported as the average of the three replicates.

TEST A (Preventive Control)

The test suspensions were sprayed to the point of run-off on Potato seedlings. The following day the seedlings were inoculated with a spore suspension of *Phytophthora infestans* (the causal agent of tomato and potato late blight) and incubated in a saturated atmosphere at 20 °C for 24 hours, and then moved to a growth chamber at 20 °C for 5 days, after which disease ratings were made.

TEST B (Curative Control)

Potato seedlings were inoculated with a spore suspension of *Phytophthora infestans* (the causal agent of tomato and potato late blight) 24 hours prior to application and incubated in a saturated atmosphere at 20 °C for 24 hours. The test suspensions were then sprayed to the point of run-off on the potato seedlings. The following day the seedlings were moved to a growth chamber at 20 °C for 5 days, after which disease ratings were made.

TEST C (Extended Preventive Control)

The test suspensions was sprayed to the point of run-off on potato seedlings. Six days later, the seedlings were inoculated with a spore suspension of *Phytophthora infestans* (the causal agent of tomato and potato late blight) and incubated in a saturated atmosphere at 20 °C for 24 h, and then moved to a growth chamber at 20 °C for 5 days, after which disease ratings were made.

Results for Tests A-C are given in Table A. In the table, a rating of 100 indicates 100% disease control and a rating of 0 indicates no disease control (relative to the controls). Columns labeled Avg indicates the average of three replications. Columns labeled Exp indicate the expected value for each treatment mixture using the Colby equation. Tests demonstrating control greater than expected are indicated with *.

Table A

Composition		Test A		Test B		Test C	
Number	Rate	Avg	Exp	Avg	Exp	Avg	Exp
1	5	0	xx	0	xx	0	xx
1	10	32	xx	0	xx	37	xx
1	20	100	xx	0	xx	98	xx
2	25	100	xx	0	xx	0	xx
2	50	100	xx	0	xx	0	xx
2	100	100	xx	0	xx	0	xx
3	25	0	xx	0	xx	0	xx
3	50	0	xx	0	xx	0	xx
3	100	32	xx	0	xx	0	xx

Composition		Test A		Test B		Test C	
Number	Rate	Avg	Exp	Avg	Exp	Avg	Exp
1 + 2	5 + 25	100	100	0	0	0	0
1 + 2	10 + 50	100	100	0	0	75*	37
1 + 2	20 + 100	100	100	0	0	99	98
1 + 3	5 + 25	0	0	0	0	37*	0
1 + 3	10 + 50	100*	32	0	0	88*	37
1 + 3	20 + 100	100	100	9	0	76	98

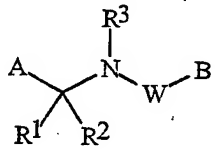
Based on the description of synergism developed by Colby, compositions of the present invention are illustrated to be synergistically useful. Moreover, compositions comprising components (a) and (b) alone can be conveniently mixed with an optional diluent prior to applying to the crop to be protected. Accordingly, this invention provides an improved method of combating fungi, particularly fungi of the class Oomycetes such as *Phytophthora* spp. and *Plasmopara* spp., in crops, especially potatoes, grapes and tomatoes.

CLAIMS

What is claimed is:

1. A composition for controlling plant diseases caused by fungal plant pathogens comprising:

(a) at least one compound of Formula I, *N*-oxides and agriculturally suitable salts thereof



I

wherein

A is a substituted pyridinyl ring;

B is a substituted phenyl ring;

W is C=L or SO_n;

L is O or S;

R^1 and R^2 are each independently H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_6 cycloalkyl, each optionally substituted;

R^3 is H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_6 cycloalkyl, C_2-C_{10} alkoxyalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl or C_3-C_8 dialkylaminocarbonyl; and

n is 1 or 2; and

(b) at least one compound selected from the group consisting of

(b1) alkylenebis(dithiocarbamate) fungicides;

(b2) compounds acting at the bc_1 complex of the fungal mitochondrial respiratory electron transfer site;

(b3) cymoxanil;

(b4) compounds acting at the demethylase enzyme of the sterol biosynthesis pathway;

(b5) morpholine and piperidine compounds that act on the sterol biosynthesis pathway;

(b6) phenylamide fungicides;

(b7) pyrimidinone fungicides;

(b8) phthalimides; and

(b9) fosetyl-aluminum.

2. A composition of Claim 1 in which component (a) is a compound of Formula I wherein

A is a pyridinyl ring substituted with from 1 to 4 R^5;

B is a phenyl ring substituted with from 1 to 4 R^6;

W is C=O;

R^1 and R^2 are each independently H; or C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl or C_3-C_6 cycloalkyl, each optionally substituted with one or more substituents selected from the group consisting of halogen, CN, NO_2, hydroxy, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_2-C_4 alkoxycarbonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino and C_3-C_6 cycloalkylamino;

R^3 is H; and

each R^5 and R^6 is independently C_1-C_6 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_3-C_6 cycloalkyl, C_1-C_6 haloalkyl, C_2-C_6 haloalkenyl, C_2-C_6 haloalkynyl, C_3-C_6 halocycloalkyl, halogen, CN, CO_2H, $CONH_2$, NO_2, hydroxy, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl, C_1-C_4 haloalkylsulfonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino, C_3-C_6 cycloalkylamino, C_2-C_6 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl, C_3-C_8 dialkylaminocarbonyl or C_3-C_6 trialkylsilyl; or

each R^5 and R^6 is independently a phenyl, a benzyl, a phenoxy, a 5- or 6-membered heteroaromatic ring or a 5- or 6-membered nonaromatic heterocyclic ring, each ring optionally substituted with from one to three substituents independently selected from R^7; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused phenyl ring, a fused 5- or 6-membered nonaromatic carbocyclic ring, a fused 5- or 6-membered heteroaromatic ring or a fused 5- or 6-membered nonaromatic heterocyclic ring, each fused ring optionally substituted with from one to three substituents independently selected from R^7;

each $R^7$is independently C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_3-C_6 cycloalkyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 halocycloalkyl, halogen, CN, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 alkylamino, C_2-C_8 dialkylamino, C_3-C_6 cycloalkylamino, C_3-C_6 (alkyl)cycloalkylamino, C_2-C_4 alkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_2-C_6 alkylaminocarbonyl, C_3-C_8 dialkylaminocarbonyl or C_3-C_6 trialkylsilyl.

3. A composition of Claim 2 wherein component (b) is cymoxanil.

4. A composition of Claim 2 wherein component (b) is a compound selected from (b2).

5. A composition of Claim 4 wherein component (b) is famoxadone.

6. The composition of Claim 1 wherein component (b) comprises at least one compound from each of two different groups selected from (b1), (b2), (b3), (b4), (b5), (b6), (b7), (b8) and (b9).

7. The composition of Claim 6 wherein component (b) comprises at least one compound selected from (b2) and at least one compound selected from (b1), (b3), (b6), (b7), (b8) or (b9); wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30; and wherein the weight ratio of component (b2) to component (a) is from 10:1 to 1:1.

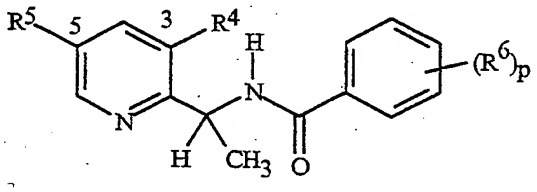
8. The composition of Claim 6 wherein component (b) comprises cymoxanil and at least one compound selected from (b1), (b2), (b6), (b7), (b8) or (b9); wherein the overall weight ratio of component (b) to component (a) is from 30:1 to 1:30; and wherein the weight ratio of cymoxanil to component (a) is from 10:1 to 1:1.

9. A method for controlling plant diseases caused by fungal plant pathogens comprising applying to the plant or portion thereof, or to the plant seed or seedling, a fungicidally effective amount of a composition of Claim 1.

10. The method of Claim 9 wherein the disease to be controlled is caused by the fungal pathogen *Phytophthora infestans*.

11. The method of Claim 9 wherein the disease to be controlled is caused by the fungal pathogen *Plasmopara viticola*.

12. A compound of Formula Ia and *N*-oxides and agriculturally suitable salts thereof



Ia

wherein

R^4 is halogen;

R^5 is C_1-C_6 alkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl;

each R^6 is independently C_1-C_6 alkyl, C_1-C_6 haloalkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl; or

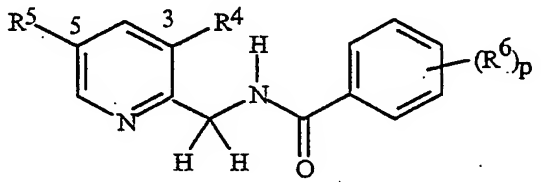
two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused 5- or 6-membered nonaromatic heterocyclic ring containing one

or two oxygen atoms and optionally substituted with from one to four substituents independently selected from F or methyl; and

p is 1, 2, 3 or 4.

13. The compound of Claim 12 wherein R^5 is Cl, Br, I, CH_3, OCF_3, $OCHF_2$, OCH_2CF_3, OCF_2CF_3, OCF_2CF_2H, $OCHFCF_3$, SCF_3, $SCHF_2$, SCH_2CF_3, SCF_2CF_3, SCF_2CF_2H, $SCHFCF_3$, $SOCF_3$, $SOCHF_2$, $SOCH_2CF_3$, $SOCF_2CF_3$, $SOCF_2CF_2H$, $SOCHFCF_3$, SO_2CF_3, SO_2CHF_2, $SO_2CH_2CF_3$, $SO_2CF_2CF_3$, $SO_2CF_2CF_2H$ or SO_2CHFCF_3.

14. A compound of Formula Ib and *N*-oxides and agriculturally suitable salts thereof



Ib

wherein

R^4 is halogen;

R^5 is C_1-C_4 haloalkoxy, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl;

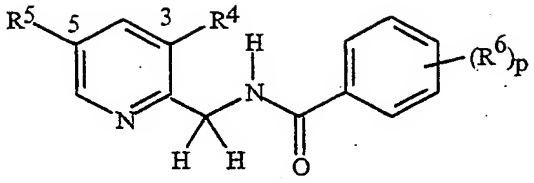
each R^6 is independently C_1-C_6 alkyl, C_1-C_6 haloalkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused 5- or 6-membered nonaromatic heterocyclic ring containing one or two oxygen atoms and optionally substituted with from one to four substituents independently selected from F or methyl; and

p is 1, 2, 3 or 4.

15. The compound of Claim 14 wherein R^5 is OCF_3, $OCHF_2$, OCH_2CF_3, OCF_2CF_3, OCF_2CF_2H, $OCHFCF_3$, SCF_3, $SCHF_2$, SCH_2CF_3, SCF_2CF_3, SCF_2CF_2H, $SCHFCF_3$, $SOCF_3$, $SOCHF_2$, $SOCH_2CF_3$, $SOCF_2CF_3$, $SOCF_2CF_2H$, $SOCHFCF_3$, SO_2CF_3, SO_2CHF_2, $SO_2CH_2CF_3$, $SO_2CF_2CF_3$, $SO_2CF_2CF_2H$ or SO_2CHFCF_3.

16. A compound of Formula Ic and *N*-oxides and agriculturally suitable salts thereof



Ic

wherein

R^4 is Cl or Br;

R^5 is Br or I;

each R^6 is independently C_1-C_6 alkyl, C_1-C_6 haloalkyl, halogen, NO_2, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkylthio, C_1-C_4 haloalkylsulfinyl or C_1-C_4 haloalkylsulfonyl; or

two R^6 attached to contiguous carbon atoms are taken together with said carbon atoms to form a fused 5- or 6-membered nonaromatic heterocyclic ring containing one or two oxygen atoms and optionally substituted with from one to four substituents independently selected from F or methyl; and

p is 1, 2, 3 or 4.

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(74) Agent: HEISER, David, E.; E.I. Du Pont De Nemours And Company. Legal Patent Records Center, 4417 Lancaster Pike, Wilmington, DE 19805 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

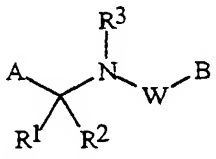
— *with international search report*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
19 February 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BENZAMIDES AND COMPOSITIONS BENZAMIDES FOR USE AS FUNGIZIDE



(I)

(57) Abstract: Compositions for controlling plant diseases caused by fungal plant pathogens are described, comprising: (a) a fungicidally effective amount of a compound of Formula (I) (including all geometric and stereoisomers, *N*-oxides, and agriculturally suitable salts thereof) wherein A, B, W, R^1, R^2, and R^3 are as defined in the disclosure; and (b) at least one compound selected from the group consisting of (b1) alkylenebis(dithiocarbamate) fungicides; (b2) compounds acting at the bc_1complex of the fungal mitochondrial respiratory electron transfer site; (b3) cymoxanil; (b4) compounds acting at the demethylase enzyme of the sterol biosynthesis pathway; (b5) morpholine and piperidine compounds that act on the sterol biosynthesis pathway; (b6) phenylamide fungicides; (b7) pyrimidinone fungicides; (b8) phthalimides; and (b9) fosetyl-aluminum.Also disclosed are methods for controlling plant diseases caused by fungal plant pathogens that involves applying an effective amount of the combinations described. Also disclosed are certain compounds of Formula (I).

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/08205

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A01N43/40 A01N47/02 C07D213/65 C07D213/61 C07D213/70
C07D213/71
//(A01N43/40,61:00,57:12,47:42,47:34,47:14,47:04,43:90,43:84,43:76)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 99 42447 A (MOLONEY BRIAN ANTHONY ;SAVILLE STONES ELIZABETH ANNE (GB); AGREVO) 26 August 1999 (1999-08-26) cited in the application page 1 - page 5, line 10; table 1 page 32; claims	1,2,6-11
A	US 5 939 454 A (BAYER HERBERT ET AL) 17 August 1999 (1999-08-17) column 1, line 7 - line 33 column 3, line 1 - line 15 column 5 - column 6	1,2,6-11
A	WO 99 31951 A (SCHELBERGER KLAUS ;BASF AG (DE); EICKEN KARL (DE); LORENZ GISELA () 1 July 1999 (1999-07-01) page 1 - page 2, line 1 page 19, line 7 - line 21	1,2,6-11

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 September 2003	08.12.03

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Müllners W.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/08205

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 03 034824 A (BAYER CROPSCIENCE S A ;MERCER RICHARD (FR); WEGMANN THOMAS (FR)) 1 May 2003 (2003-05-01) the whole document	1,2,6-11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 03/08205

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1,2,6-11 (all partially)

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1,2, 6-11 (all partially)

A composition for controlling plant diseases caused by fungal plant pathogens comprising (a) at least one compound of formula I of claim 1, N-oxides and agriculturally suitable salts thereof and
(b) an alkylenebis(dithiocarbamate) fungicide,

and a method for controlling plant diseases caused by said pathogens comprising applying said composition to the plant or portion thereof, or to the plant seed or seedling

---

2. claims: 1, 2, 6-11 (all partially) , 4, 5 (all complete)

as item 1, but component

b) is a compound acting at the bc1 complex of the fungal mitochondrial respiratory electron transfer site

---

3. claims: 1, 2, 6-11 (all partially) , 3 (complete)

as item 1, but component

b) is cymoxanil

---

4. claims: 1, 2, 6, 9-11 (all partially)

as item 1, but component

b) is a compound acting at the demethylase enzyme of the sterol biosynthesis pathway

---

5. claims: 1, 2, 6, 9-11 (all partially)

as item 1, but component

b) is a morpholine or piperidine compound that acts on the sterol biosynthesis pathway

---

6. claims: 1, 2, 6-11 (all partially)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

as item 1, but component

b) is a phenylamide fungicide

---

7. claims: 1, 2, 6-11 (all partially)

as item 1, but component

b) is a pyrimidinone fungicide

---

8. claims: 1, 2, 6-11 (all partially)

as item 1, but component

b) is a phthalimide

---

9. claims: 1, 2, 6-11 (all partially)

as item 1, but component

b) is fosetyl-aluminium

---

10. claims: 12, 13 (all complete)

compound of formula Ia of claim 12, and N-oxides and agriculturally suitable salts thereof

---

11. claims: 14, 15 (all complete)

compound of formula Ib of claim 14, and N-oxides and agriculturally suitable salts thereof

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12. claim: 16 (complete)

compound of formula Ic of claim 16, and N-oxides and agriculturally suitable salts thereof

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 03/08205

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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